Chemical Age

B.C.P.M.A. ANNUAL DINNER
(page 641)

VOL. 82 No. 2104

7 November 1959

THE WEEKLY NEWSPAPER OF THE CHEMICAL INDUSTRY

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# INDEX TO ADVERTISERS

*The first figures refer to advertisements in* **Chemical Age Directory & Who's Who,** *the second to the current issue*



(*Continued on page 634*)

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## IN THIS ISSUE



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CHEMICAL AGE

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# CHEMICAL PLANT INDUSTRY

BRITISH chemical plant manufacturers are concerned about their industry, as well they might be. Allied as they are to the British chemical industry their progress is closely related. As contractors, as fabricators, as suppliers of all manner of equipment, members of the British Chemical Plant Manufacturers Association have been initially associated with new chemical projects. But over the last 18 months the "tempo of development" as Mr. H. W. Fender, chairman of the B.C.P.M.A. expressed it last week at the Association's annual dinner (see p. 641) has slowed down considerably.

Reasons for the slow down have been hold ups in capital investment, an unsettled economic outlook, and a 'large number' of projects being held in cold storage, so that instead of a steady flow of orders the industry has suffered a series of peaks and troughs. The B.C.P.M.A. feels that the chemical industry has not been using the plant contractors and plant industry to the full, and it now seeks a closer partnership with the chemical manufacturers, at every stage of development of a process and plant project. This, the B.C.P.M.A. maintains, would offer more rapid solution of chemical manufacturers' plant problems, and ensure that plants are more quickly 'on stream.'

Plant contractors need chemical process know-how to develop on the overseas side. Quite a few British chemical plant manufacturers are finding themselves handicapped in tendering for overseas plants because they do not always possess process 'know-how.' There is, according to Fender, only "an awareness in some quarters of the need for this kind of co-partnership between chemical manufacturer and contractor, and a willingness by certain chemical manufacturers to play their part." Also he thinks that the day of the consortium will have to come—sound technological groupings of chemical plant contractors and chemical manufacturers to handle large overseas projects.

What then are the views of British chemical manufacturers? Until recently chemical manufacturers and chemical plant manufacturers have worked 'tolerably well' together. So states Sir Walter Worboys, chief guest at the B.C.P.M.A. annual dinner. But he questions whether they are the best to serve the chemical manufacturers in the growing competitive conditions at home and abroad and whether they can ensure maximum performance in export markets by either chemical manufacturer or chemical plant manufacturer.

If by chemical plant manufacturer is meant one who offers a plant which produces a chemical ready for sale, then only about 10% of the B.C.P.M.A. members are truly chemical plant manufacturers. The chemical plant manufacturer wants to see the chemical manufacturer expand but to do this the latter requires good plants cheaply which can be quickly in production. The chemical manufacturer has often found it preferable to ensure the necessary collaboration between research and development and engineering required for new plant to do all plant design, procurement and construction within his own organisation.

There are important reasons for this and they were outlined by Worboys. The chemical plant manufacturers' own research and engineering depart-

ment staffs have not generally been of the same calibre as those of the chemical manufacturer and confidential information on technical know-how and processes has not always been handled satisfactorily. Also plant contractors often lack experience in the building of plant for expansion and improvement of production of existing products, since they lack the necessary operating data.

There are, of course, some notable exceptions, particularly in the field of petrochemicals, gas production and nitrogenous fertilisers, but in practically every instance the chemical plant manufacturer offering such packaged plants has got process and construction 'know-how' from a foreign source (i.e. the U.S., Germany, Italy, or France) and not from British chemical manufacturers.

Worboys calls on British chemical manufacturers not to be so secretive. There is, we think, a relevant answer here. British chemical manufacturing is relying more and more on speciality chemicals or high quality products to enter overseas markets. In many cases, the market does not require more than one supplier. As demand, albeit limited, grows, the chemical manufacturer expands his plant, but he is the more familiar with it and can set about the expansion efficiently. Hence the value of his own engineering set-up. It would, under present conditions, be time-consuming and inefficient to call in a chemical plant manufacturer with no knowledge of the plant to handle expansion plans. Also since it is the chemical manufacturer who decides on a new plant, he needs expert chemical engineering advice and for his advisers to remain expert they must themselves do some design and construction, and to supervise chemical plant manufacturers for such work as they do put out.

The position facing the chemical plant manufacturers is a difficult one. Viewed as a whole, if Britain's chemical plant manufacturers are to gain overseas contracts, they must combine with chemical manufacturers, either British or foreign, to gain process and technical construction know-how. For the greater economic benefit to the U.K. it is hoped that the chemical plant manufacturers will ally themselves with British chemical manufacturers. The small chemical plant manufacturers will have to band together for strength. The larger companies should seriously consider joining the chemical manufacturers or the latter could amalgamate their engineering divisions with chemical plant contractors. This type of movement is now taking place in the U.S.

There is also certainly much scope for closer partnership in the home market. This would lead to a more economic use of scientific and technical effort. Worboys saw one avenue for co-operation on greater specialisation on the part of the plant companies. It would be to the benefit of both if a new and closer relationship could be built up on the basis of mutual trust, for a strong, competent chemical plant industry would mean a quicker 'on-stream' time, better and cheaper plants.

## ELECTRON-EXCHANGE POLYMERS

SINCE the pioneering work of Cassidy 10 years ago, little attention has been devoted to the study and applications of polymeric structures carrying a plurality of sites capable of accepting or donating electrons. These so-called electron-exchange or redox polymers are formed by synthesis or incorporation of suitable reversible electron donor/acceptor molecular species into a polymeric framework. A typical example is the quinone-hydroquinone system which behaves as a reversible electrochemical couple. By appropriate variations in the structure of the electron donor/acceptor, reaction medium and pH it should be possible to run the gamut of oxidation-reduction potentials with these substances.

The National Chemical Laboratory has been exploring some new approaches to the synthesis of electron-exchange polymers and it has been found possible to prepare modified celluloses and other hydrolyxated polymer systems possessing reversible oxidation-reduction properties. Experimental work, to date, has been concerned with the reactions of certain halogenated quinones with mono-, di- and polyamino compounds, and with mono-, di- and polyhydroxy compounds in the form of their alkali metal derivatives.

Chloranil (tetrachloro-1:4-benzoquinone) reacts with ammonia and with primary, secondary and tertiary amines. With di- and polyamines polymeric products are obtained and these have displayed electron-exchange properties. With sodium alkoxides, chloranil gives dialkoxy dichloroquinones. Sodium and potassium derivatives of cellulose, prepared from the aqueous alkalis, react with chloranil to give a stable polymer with electron exchange properties.

Bis-chloromethyl derivatives undergo condensation reactions with hydroquinone diacetate to give polymers, which after hydrolysis, exhibit good electron-exchange properties and have a reducing capacity of the order of 10 m. equiv./g. In the reduced form the resins inhibit peroxide formation in *iso*propyl ether.

Apart from the very interesting theoretical problems opened up by these redox polymers, the *Report of the National Chemical Laboratory 1958* shows, they provide a new chemical for the study of many chemical and biochemical problems. They have been successfully used for removal of dissolved oxygen from boiler feed water and other solutions, for maintenance of anaerobic conditions in culture media, for preparation of hydrogen peroxide, as polymerisation initiators (reduced form), as catalysts (oxidised form) in organic and other oxidations, as anti-stain agents in photographic emulsions and as antioxidants.

## FERTILISER CHARTERINGS

MAIN shipping interest in fertilisers during October was for azotic materials with communist China the principal importer. Apart from half-a-dozen known fixtures for ammonia sulphate of Italian and Continental origin, it is believed the Peoples' Republic engaged considerably more tonnage at freight rates much above recent levels. *The Monthly Freight Review* states that secrecy also surrounds the booking by China of a 10,500 tonner for sodium nitrate from Chile—informed market guessing putting the rate at around 85s a ton f.i.o., on the basis of one port loading. The competitive position of this nitrogenous fertiliser may well be enhanced when the new loading installation at Tocopilla, scheduled to handle 1,200 tons an hour, comes into operation early in 1961. If this also eliminates the costly delays to shipping on that coast caused by surf it should produce a considerable reduction in the freight element.

Phosphate charterings were decidedly quieter and some speculation exists as to whether the devaluation of the Moroccan franc may lead to any price change in the new year. U.S. sources were inviting freight offers early in the month for 150,000 tons of Florida pebble for shipment to South Africa over next year, but nothing appears to have come of the affair. Somewhat surprising among the list of Kola fixtures to fellow-communist countries was the chartering of a 5,000 tonner from Murmansk to Savona. Another exploration of unusual sources of supply was evidenced by a demand for freight offers over the first half of next year for 25,000 tons from Aqaba to Sicily and Cagliari.

Sulphur stayed quiet, with a few bookings Gulf to U.K. (liner space) and for Lacq to Finland. Numerous small orders for the latter remain unfilled. Rumours of 40/60,000 tons being sold c.i.f. from the U.S. Gulf to South Africa and of a covering freight contract lacked confirmation from the interested parties. Sicilian sulphur made a reappearance, inviting freight offers of 2,500 tons Porto Empedocle to Sfax.

## B.C.P.M.A. ANNUAL DINNER

# Plea for Closer Partnership Between Chemical Makers and Plant Firms

★

### H. W. FENDER

**"The day of the consortium will have to come—sound technological groupings of chemical plant contractors and chemical manufacturers to handle some of these overseas projects which are going to be huge and on which we should quote nationally and not against each other"**

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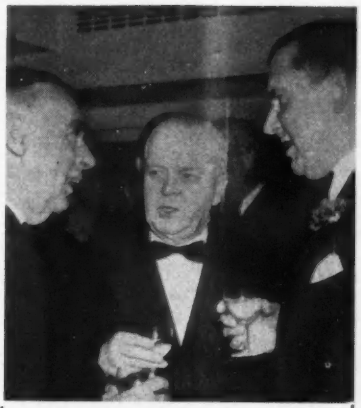


Sir Walter Worboys, left, with H. W. Fender, chairman, British Chemical Plant Manufacturers' Association, and Dr. E. H. T. Hoblyn, right, director, B.C.P.M.A.

★

### SIR WALTER WORBOYS

**"If the chemical plant manufacturer is to be given responsibility for design, procurement and construction, then he and his staff must be of the same calibre and must command the same skills and must win the same respect as does the chemical firm's own engineering department"**

★

**RELATIONSHIPS between the chemical manufacturer and chemical plant manufacturer were found wanting by both speakers at the annual dinner last week of the British Chemical Plant Manufacturers' Association. Both saw benefits in much closer co-operation; both made criticisms of present arrangements.**

**Mr. H. W. Fender (Prodorite Ltd.), B.C.P.M.A. president, felt that chemical firms had not made sufficient use of plant manufacturers as contractors; the plant manufacturer should be in on every stage in the development of a process. Overseas contracts had been lost because plant firms did not have the process 'know-how' and Mr. Fender thought that consortiums of chemical and plant firms would be formed to handle those contracts.**

Sir Walter Worboys (I.C.I.), vice-president, Association of British Chemical Manufacturers, analysed the present relations between the two industries. He saw faults on both sides and instanced the ingrained secrecy of the chemical manufacturer and the size of the plant firms. He doubted if they were large enough to win the chemical manufacturer's confidence. Fewer, bigger firms would place the U.K. plant industry in a more competitive position.

He suggested one avenue for closer co-operation in specialisation. Both industries would benefit if plant firms gained more experience in contracting work for that should mean cheaper and better plants. He defended the right of the larger chemical firms to continue their own engineering departments; whatever co-operation emerged they could not be expected to abandon them for they were vital to the development of new products and processes.

The dinner, held in Grosvenor House, London, W.1, on 28 October attracted a record number of members and guests, which, totalling 850, was 100 more than the 1958 annual dinner. Among overseas guests were some from France, Japan, Russia and the U.S.

Mr. Fender said that co-operation must develop if they were to make the maximum use of their technical resources. In the last 18 months there had been a holding up of capital investment. Now, however, the economic outlook was steadily improving and many projects that had been in cold storage would be released. If the chemical industry could arrange a steady flow of orders—rather than a series of peaks and troughs—it would not only help itself but would also be doing the plant industry a good turn.

The B.C.P.M.A. heartily agreed with the recent view of the Select Committee on Estimates which stressed the need for industry to play a greater part in certain activities of the Production Group and Development and Engineering Group of the Atomic Energy Authority. This would enable the resources available to be economically employed.

The association felt that in the past the chemical industry had not used its members to the full. It came to them for items of plant, but seldom used them as contractors. In spite of "some lack of encouragement" they had built up their contracting and other services so that with full confidence in their competence he urged the chemical industry "to bring us into closer partnership at every stage of development of a process".

If the plant contractor was brought in early enough, the problem of getting the plant on stream quickly would be nearer solution. Effective use must be made of the plant industry's manpower and that was not achieved by chemical firms doing certain design work that could be done for them.

Referring to overseas projects, Mr. Fender said the British plant manufacturer had been precluded from tackling a number of projects for Russia and elsewhere, because he did not possess the process 'know-how'. The position was changing a little, and in some quarters there was an awareness of the need for that kind of co-partnership between chemical manufacturer and contractor and a willingness by certain chemical manufacturers to play their part. But, he added, the change was taking place rather slowly.

If they were to retain their foothold in developing countries that wanted to set up their own chemical industries, it would have to be through some form of co-partnership by British companies putting down their own plants overseas, or by the supply of know-how. Either way contracting services and plant would be needed and he wanted those to be supplied by the British industry. He also thought that the day of the consortium would have to come—sound technological groupings of chemical plant contractors and chemical manufacturers to handle some of those overseas projects on "which we should quote nationally and not against each other".

## B.C.P.M.A. ANNUAL DINNER

# Worboys on Ways of Getting Cheaper and Better Plants

BRITISH chemical manufacturers and chemical plant manufacturers should be working so well together that whenever a chemical manufacturer licensed a process abroad, he would endeavour to arrange that a British chemical plant firm built the plant or played a large part in its design. This was stated by Sir Walter Worboys when he replied to the toast.

The 245 B.C.P.M.A. member firms included those who could design, engineer and construct an entire chemical plant project either on the basis of flowsheet and technical data supplied by the chemical manufacturer or based on technical information derived in some other way.

That structure and the relationship between the two industries had until now worked tolerably well, but Sir Walter questioned whether they were the best that could be devised in the competitive conditions that would have to be faced at home and overseas. He also questioned whether they were the best to ensure maximum performance in export markets either by the chemical or the plant manufacturer. He questioned, too, whether they would lead to the most efficient employment of scientific and technical personnel.

### Definition of 'Plant'

He stressed that when he used the term 'chemical plant', he meant plant that produced a chemical ready for sale. To him a chemical plant manufacturer was one who offered a plant embracing all the stages from raw materials to finished chemicals and not one who merely offered the individual items of equipment that comprised such plant.

By that definition, it would appear that only about 10% of the members were truly chemical plant manufacturers. In saying that he did not belittle the contribution of the rest of the members. Far from it because the effectiveness of a plant was determined not only by the brilliance of the overall design and arrangement, but also by the effectiveness of individual items of equipment.

Appreciation of this point of definition could improve the team-work of the chemical manufacturer and the chemical plant manufacturer to their mutual benefit. The chemical firm's demand for plant would be either for the manufacture of a new product or for the expansion or improvement of production of an existing product.

Where a new product was concerned, the laboratory and pilot plant work would have provided the flowsheet and the design and building of the plant would call for close and continuous collaboration between the research people, the engineers and the commercial people. In very many cases, the chemical manufacturer had found it easier to ensure this collaboration if all the plant design, procurement and construction was done within his own organisation.

**"If the chemical plant manufacturer is to be given responsibility for design, procurement and construction, then he and his staff must be of the same calibre and must command the same skills and must win the same respect as does the chemical manufacturer's own engineering department. And questions of confidential information must also be handled satisfactorily."**

Similar reasoning also held for the building of plant extensions, but the essential was close collaboration between production and engineering personnel so that operating experience to date could be built into the extension. If the chemical plant manufacturer was to get the business he must find ways of acquiring that experience.

It would be wrong to assume that no progress had been made; there were notable examples—particularly in petrochemicals, gas production and nitrogenous fertilisers—where a high degree of confidence had been established between chemical manufacturers and the chemical plant firms; as a result there had been substantial business. Plant manufacturers would find it worthwhile to study why this had happened in the fields mentioned.

In trying to extend the fields of close co-operation, the two associations, A.B.C.M. and B.C.P.M.A., could help by creating a favourable atmosphere, but the real work must be done by individual firms. No one plant firm could hope to be expert in the whole field of chemical manufacture, any more than one chemical firm could. But specialisation by firms in particular parts of the field could no doubt be arranged, as already occurred to an extent.

### "Not Big Enough"

Sir Walter doubted "whether the present size of chemical plant manufacturing firms is sufficiently big for them to be able to build up staff of the size and competence to win the confidence of chemical manufacturers". He certainly felt that fewer and bigger firms might be an advantage and might indeed enable U.K. chemical plant makers to do more research and development work and thereby offset such advantage as U.S. and German chemical plant manufacturers doubtless enjoyed, which stemmed from the size of their home markets.

He declared that it was not only on the side of the chemical plant manufacturers than an effort was required: the chemical manufacturer must also make an effort and in particular he must try to overcome the habits of secrecy that had become deeply ingrained. While some information must be kept secret, there was a mass of non-confidential information and experience which would benefit both industries if it could be made generally available. The problem was to develop suitable mechanisms for making that possible.

**He thought that however successful they might be in building up confidence between the two industries, it would be "quite wrong to think that the larger chemical manufacturers could disband completely their engineering design and construction departments".**

It was the chemical manufacturer who decided whether or not to invest in plant for a new chemical and in making his decision he would need expert engineering advice. For his engineering advisers to remain 'expert' they must themselves do some design and construction. They also needed that expertise to choose and to supervise the chemical plant manufacturer for such work as was put out.

For new production, where the secrecy factor was strong, or where new techniques must be worked out, the arguments for doing the design and construction work within the chemical firm's organisation would always be strong.

If the chemical and plant industries could evolve in the ways suggested, Sir Walter was sure there could be economy in the use of technical personnel and he felt that they would be on the road to getting better and, he would hope, cheaper chemical plants.

### Better Plants

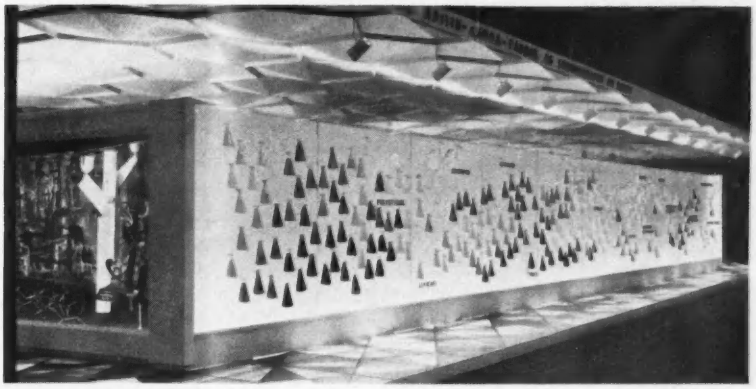
He used the term 'better plants' because generally the chemical firm's own engineering department would build one or two plants of a given type. A plant maker might on the other hand build several and their Mark V, for instance, ought to be a better plant than their Mark II. Also, the greater experience which they would get should mean that plant makers would find themselves in a better position to compete in export markets. That could be of considerable importance because there would be a demand for plants from underdeveloped countries—simple plants for those just beginning to industrialise and more complicated plants for countries well on the road to industrialisation. Orders would only be won, however, if Britain were competitive both in quality and price.

Affirming his belief that the British chemical industry had great possibilities for expansion he declared that that must also mean that the manufacturers of chemical plants and equipment also had great prospects. The chemical manufacturer must realise that there were advantages to him in giving to the plant manufacturer responsibility for the design, procurement and construction of some of his new plants or plant extensions. And the plant maker must realise that his organisation and performance must be such as to inspire and hold the confidence of the chemical manufacturer. Likewise, equipment firms had the problem of inspiring confidence and of winning access to plant operating experience.

These were matters well capable of achievement if both sides appreciated the advantages that satisfactory solutions held for them.

# NEW PLASTICS SHOWN AT DÜSSELDORF

## *Round the Stands with C.A. Reporter*



**Every part of the B.A.S.F. stand at Düsseldorf, from the ceiling, walls and floor to the furniture in the reception room, was made of plastics from the company's base materials. In the foreground is a complete range of starting chemicals for plastics; the flasks contain polystyrene, polythene, polyamide and polyvinyl carbazole, of which B.A.S.F. were the sole exhibitors**

MANY new developments were seen by more than 300,000 visitors, a third of them from outside Germany, who attended Plastics 59, the world's biggest plastics exhibition and trade fair held in Düsseldorf from 17 to 25 October. The widest range of plastics and plastics materials ever exhibited was shown by manufacturing and processing companies from all over Europe and from both North and South America. Phased with the exhibition was the Eighth German Plastics Conference—which this year was of an international nature—and an international symposium on the 'Ageing of plastics' in Düsseldorf, and an international symposium on 'Macromolecules' in Wiesbaden.

The U.K. was well represented in most branches of plastics base materials and with several ranges of finished products. Ten British concerns took part in a joint display organised by the U.K. Government and the British Plastics Federation, and the latter body itself ran an information stand. Leading companies taking part in the joint stand were Bakelite Ltd., British Geon Ltd. and Commercial Plastics Ltd., while I.C.I. staged a separate show through the Frankfurt-on-Main office of their subsidiary, Imperial Chemical Industries (Export) Ltd., and Shell International Chemical Co. Ltd. teamed up with the German member of the Shell group Deutsche Shell AG, of Hamburg.

An indication of the importance which Germany has attained and is still attaining in the plastics world is the fact that the country's plastics production, after rising last 15% on 1957 totals to some 643,000 tonnes, increased by a further 25% in the first half of this year on the figure for the same period of 1958; estimates for the current year set German plastics output at 800,000 tonnes. German exports rose by 16% and 26% respectively, for these two periods, some £26,875,000 being the export turnover for the months of January-June 1959 alone. The plastics processing industry, whose 1959 half-year production and turnover were, at £91,670,000, up by 21% on the 1958 period, exported in the first six months of this year to the value of £11,600,000, or 18% more. It is, then, understandable that Germany should have played a part at Plastics 59 which was more than simply that of a host.

It was a German firm which exhibited one of the most revolutionary uses for plastics—its liquid bonding with steel—in the show. Trierer Walzwerk AG, a subsidiary of the Hoesch steel group, showed the first liquid-plastics coated steel strip to be manufactured in Europe, under the name of 'Platal' (see CHEMICAL AGE, 31 October, p. 614).

*Variety of p.v.c. forms.* Polyvinyl chlorides were shown by a host of exhibitors in a host of forms which ranged from packaging foils to hard industrial piping. P.v.c.'s of general interest were the Hostalit Z high-impact-proof and highly flexible range from Farbwerke Hoechst AG, of Frankfurt-on-Main, a full range of p.v.c. emulsion polymers by the Shell group, the Viplavil p.v.c. copolymers designed to resist most chemicals. Hard and soft piping and moulds—including the new p.v.c.-chlorinated polythene polyblends with a temperature range of from minus 40°C to plus 85°C—were on show, together with packaging and industrial foils, on the stands of a long list of exhibitors, including those of the French, Belgian and Italian group exhibitors.

*Polythene products.* Over 50 exhibitors, including I.C.I., Union Carbide Corporation (U.S.), Montecatini, Bakelite Ltd. and Omni Products Corporation (U.S.), showed polythene and polythene products. Packaging uses were the main stresspoint in this section, particularly in the case of exhibitors from Germany, where one-half of all polythene is now processed into foils for packaging, electrical and allied uses. A range of self-sealing foils and tapes by the Ghent company Société Industrielle de la Cellulose in the products line and the Alkathene and Melinex of I.C.I. as polythene bases attracted much attention, but it was a German firm—B.A.S.F.—which beat the field with what it claims to be the widest range of polythene grades in Europe. This was its high-molecular polythene Lupolen, main producer of which is the joint B.A.S.F.-Shell subsidiary Rheinische Olefinwerke GmbH in whose plant near Cologne output of it is soon to be raised from 40,000 through 75,000 to 120,000 tonnes annually. Obtainable either in 100% processed form or made up together with the company's polyisobutylene Oppanol, Lupolen is said to have good electrical insulation properties, be flexible even at low temperatures, strong, unaffected by water and aqueous solutions, water vapour and most chemicals and can be extruded or injection-moulded to virtually all the usual plastics products, both in the household and industrial markets.

*New materials.* It was B.A.S.F., too, who showed several materials as a sole exhibitor. These included polyethyleneamine, polyvinyl carbazole (this is stated to have good dielectric properties and temperature resistance of up to 180°C, and is used for injection moulding) and polyvinyl proponiate. Apart from the Mülheim-on-Ruhr firm of Polymer-Synthese-Werk, B.A.S.F. were the only exhibitor of polyisobutylene (which they recommend for the manufacture of insulating sheets, protective clothing and allied items) and apart from Röhm and Haas GmbH, of Dortmund, the sole displayer of polyacrylates and copolymers. Röhm and Haas were, in turn, the only company present to exhibit the base materials polyacrylic acid and polymethacrylic acid.

Among the more commonly known materials, there was a wide and international show of polypropylenes. There was little new in this branch, although much interest was shown by trade visitors in such polypropylenes as the Hostalen PP of Farbwerke Hoechst, several British exhibits in the raw material range and the large range of household goods for which this cheap, 135°C heat-resistant and tough material can be worked.

*Polycarbonates.* Düsseldorf was the site of the first-ever show of a comprehensive range of polycarbonates. Unexpectedly, these were exhibited by West German companies. Most of the ten companies concerned showed foils and piping, for which this minus 100°C to plus 135°C plastics material is ideally suited. Only one—Farbenfabriken Bayer AG—displayed polycarbonate as a raw material. Most interesting in this field was the

(*Continued in p.* 646)


★ SIR WALTER WORBOY'S views on why the larger chemical manufacturers find it necessary to carry out much of their own plant design and engineering work—expressed in London last week (see p. 641)—found an echo at the Oldbury Works of Albright and Wilson (Mfg.) on Tuesday this week. Visiting their three latest plants—for phosphorus pentasulphide, tributyl phosphate and development chemicals, such as phosphonitrilic chloride—I learned that all were designed and engineered, and partly built, by the company's own engineering department. Apart from the fact that A. and W. have developed the processes concerned, they find it more economic to keep new plant design and construction under their own control.

My visit to Oldbury on Tuesday, along with other technical journalists, was a memorable one. It was the first time in the history of the works, which goes back over a hundred years, that the technical Press had been admitted. My first impression was of patchwork-development—modern plants alongside older ones; older buildings to which more recent extensions had been made. The visitor cannot fail to be impressed, however, by the feeling of efficiency and competence; it should not be forgotten that the Oldbury research laboratories have produced many of the world's major developments in phosphorus chemistry.

I learned from Mr. J. K. Bottomley, production director for A. and W. (Mfg.) how the company has grown since the war in parallel with the development of the synthetic detergent industry. He told me that some 40-50% of the company's phosphates now "go down the drain."

★ NEWS of duplication in newly formed societies dealing with forensic science was given to delegates at a meeting convened at Nottingham University recently. The Forensic Science Society had just been formed by unanimous vote, when the inaugural meeting was told that the British Academy of Forensic Science had been formed in London earlier in the year.

Mr. Stuart Kind, of Harrogate, informed the delegates at Nottingham that their meeting was too far advanced to permit change of plans when he first received news of the London society. But communication with the latter had evoked a reply to the effect that there was no question of competition.

Chairman of the Forensic Science Society, Dr. David Patterson, of Leeds University, said it was rather absurd that these should be two similar bodies, and he believed the two would inevitably combine. He states that aims of the society are the advancement of the study and application of forensic science and promotion of functions.

The British Academy of Forensic Science plans to establish a research committee which will, it is hoped, stimulate research into problems of medical jurisprudence. The academy, which is to hold its first scientific meeting in London next year, will comprise three main sections: science, medicine and law.

★ THE new carbamate herbicide, barbane, which will be distributed and developed in Western Europe and Scandinavia under the trade name Carbyne by Fisons Pest Control Ltd. (CHEMICAL AGE, 24 October, p. 572), is the first result of a five-year project undertaken by Spencer Chemical, Kansas City, Mo. The project was based on 4-chloro-2-butyn-1-ol, a compound with a chloro group and an acetylenic link.

Many derivatives were prepared, among them being the carbamates. Barbane—4-chloro-2-butynyl *N*-(3chlorophenyl) carbamate—has an extremely sensitive structure and greenhouse tests showed that it held promise as a herbicide for wild oats. Spencer Chemical say that it appears to be a mitotic poison that inhibits cell division.

Starting point for the material is butyne diol which reacts with 3-chlorophenyl isocyanate to give about 90% conversion to hydroxycarbamate. This then reacts with thionyl chloride—with a similar conversion—to give barbane. According to the company there are no serious handling or soil residue problems.

The hope is, I understand, that the exclusive licence granted to Fisons will lead to closer collaboration between the two companies.

★ THE granting of a 42-hour week to between 60,000 and 70,000 of their manual workers by I.C.I. last week attracted the newspaper headlines. The unions, who, I gather, 'leaked' the news to the press, are naturally delighted with this development at a time when storms are brewing in other industries over demands for a shorter working week. It cannot be long before the general chemical industry steps into line on a 42-hour week.

The reduction, which amounts to two hours less a week, will probably come into force early in the new year. A number of continuous shift-workers are already on a 42-hour week and a further small number of 'non-continuous three-shift workers' will for technical reasons only be able to come down to a 42½-hour week.

The agreement was reached in a smooth harmonious atmosphere that should be an object lesson to industry in general. The company has been free of major labour troubles for so long that it is difficult to remember the last occasion. Why this should be so was lucidly explained by Sir Alexander Fleck at a recent meeting in Scotland and reported in our leader page last week.

★ WHEN Lord Hailsham recently said that smaller firms often found it difficult to get research carried out for them, but that the Department of Scientific and Industrial Research would now be able to meet their needs (CHEMICAL AGE, 31 October, p. 603) he was overlooking the claims to recognition of the many independent research organisations which for many years have undertaken research on a contract basis.

Already Mr. W. H. Stevens, honorary secretary of the British Association of Consulting Scientists has made this clear in a letter to the *Financial Times*. That paper, however, either by accident or by deference to the tradition that consultants should not advertise, did not print the name of the association. Mr. Stevens pointed out that sometimes companies in need of research did not know where to go for independent scientific advice.

The long-established rule that consultants must not advertise their services is only serving to prevent the spread of research to smaller firms. It is time that this tradition—which has no place in our present scientific and technological age—should be swept away.

Consultants should be allowed to advertise their services by the business-card type of advertisement. This is done in the U.S. and has not led to any widespread abuses; at least it keeps industry informed of the research facilities available.

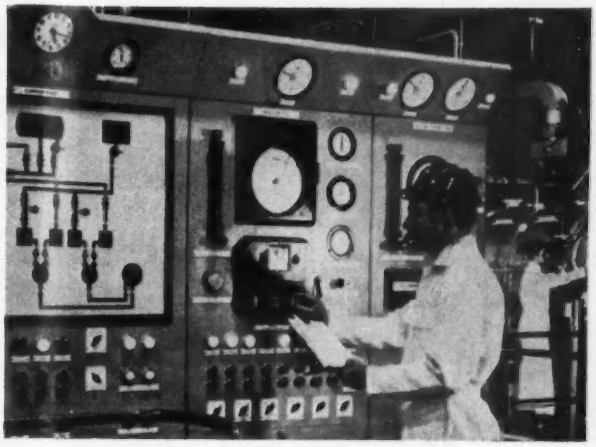
★ LIKE many of my readers, I have always baulked at the idea of learning Russian well enough to translate scientific articles. Now, however, I have the assurance of Professor J. W. Perry, director of the centre of documentation and communication research, Western Reserve University, Cleveland, Ohio, that "A practical working knowledge of scientific Russian is not as difficult to acquire as most scientists think".

Perry's interest in Russian originated when he was an industrial chemist some years ago. Realising that much useful data related to current patent disputes was appearing in Soviet publications, he taught himself the language. Eventually he wrote several books including 'Chemical Russian Self-taught' and 'Scientific Russian—A Textbook for Class and Self-study'. A simplified abridgement of these books has been specially published as a convenient 32-page pamphlet.

The booklet certainly starts in a simple, informal way and should be of value to all chemists who seek to keep abreast of Russian work in their own field.

*Alembic*

# THREE NEW PLANTS FOR A. & W. GROUP ON STREAM AT OLDBURY



**Control panel of the new automatic phosphorus pentasulphide plant at Oldbury**

THREE new plants brought into operation at the Oldbury Works of Albright and Wilson (Mfg.) Ltd. have increased output there by about 10%. Two of the plants—for phosphorus pentasulphide and alkyl phosphates—incorporate new developments, both chemical and engineering; the other is a general purpose plant for the manufacture of new products just out of the research stage.

These three plants, together with extensions to the Oldbury research laboratories due for completion shortly, have cost more than £750,000. The plants were designed and engineered by Albright and Wilson (Mfg.) and were built by the company in conjunction with chemical plant contractors. For the first time the company used models in conjunction with the design of the phosphorus pentasulphide and alkyl phosphates plants. Made by Industrial Models Ltd., Ashton-under-Lyme, these are said to have halved design costs.

## New Projects Planned

Two new projects that are due for completion next year include an extension (now in the drawing board stage) to the oil additives concentrate plant. This extension will be housed in the former phosphorus pentasulphide building; the latter material is used in the production of oil additives which Albright and Wilson (Mfg.) make for an associated company, Lubrizol Great Britain Ltd. The other new expansion project will raise production of materials used in an anti-corrosion treatment for steel and as a pre-coat before the application of paint.

**Phosphorus Pentasulphide.** This automatic plant has been built at a cost of over £250,000 to cope with rising demand. It also provides a product of higher purity and has helped cut production costs. In addition to use in oil additives, the product is an intermediate in ore flotation reagents and systemic organo-phosphorus insecticides. The capacity of some 4,000 tons a year—which can be doubled within the same building—is sufficient to meet all U.K. demands for many years. The product is exported all over the world and has taken some U.S. trade.

Phosphorus pentasulphide, with the empirical formula $P_2S_5$, is manufactured by the interaction of molten phosphorus and molten sulphur in one of the twin manufacturing units. The two raw materials are pumped from outside storage tanks into weigh-measure vessels, which feed the reactors. Feed-rate of both phosphorus and sulphur is controlled from an electronic flowrate device on a central graphic panel.

After the reaction is complete, contents of the making vessel are blown into an electrically-heated holding vessel. From here, the molten pentasulphide is pumped round a ring-main heated by Isojackets and is tapped off as required to one of two flaking and milling units. These units consist of a flaker, water-cooled screw feeds feeding the material to a prebreaker, and a mill.

Due to the great fire hazard, the entire system is continually purged with carbon dioxide, and in addition the flaking and milling sections have automatic explosion detection devices by Graviner.

The ring-main heating by Isojackets is an extensive installation and is a first-time use of the system for this product.

**Alkyl Phosphates.** Main product of this plant, also installed to meet growing demand and more exacting specifications, is tri butyl phosphate (TBP), whose two main uses are in atomic energy and plastics. With a daily make of about one ton, the unit is now working at about 60% of capacity. It represents a completely original process devised by the Oldbury research department; the plant was designed and engineered by the company's engineering department.

Principal customers are in the atomic energy field and a good export trade has been developed with Canada despite a cheaper U.S. product. Tri butyl phosphate forms a complex with uranium nitrate in very dilute solutions. Applications are now being extended to thorium, vanadium, hafnium and zirconium. It is also used as an anti-foaming agent in the newer types of emulsion paint.

**Separating organic layer from water layer on the alkyl phosphates plant**

Other products produced here are plasticisers with good low temperature properties: tri-iso-octyl phosphate (trinonyl can be produced if required) and tributoxyethyl phosphate (due in production shortly). The latter product has uses in polishes based on synthetic resins.

The basic reaction is for TBP:

$$3.ROH + POCl_3 \longrightarrow (RO)_3PO + 3HCl$$

The process depends on the fact that HCl is soluble in the phosphatic esters of some alcohols. The reaction is continuous, the raw materials being metered into a Pfaudler glass-lined reactor, matured for eight hours and neutralised to pH 8.5 with 20% NaOH. It is settled and separated, the water layer going to effluent storage. The organic layer is washed with wet butanol (92% water) and settled, the water layer again going to an effluent tank.

The organic layer is then distilled in two stages, (a) atmospheric distillation which removes first wet butanol and then dry butanol; (b) vacuum distillation to remove the rest of the dry butanol, the ester then being distilled over to product receivers for daily testing before pumping to final storage. The wet butanol is stored for use in washing the neutralised product. Dry butanol returns to the main tank for re-use in the process.

There is a steam stripping column where effluent washings are stripped to remove wet butanol.

Tri-iso-octyl phosphate is made with some differences. There is no wash stage with wet alcohol. After neutralisation, the material goes to the vacuum still where first wet, then dry iso-octanol are removed. The material is then steam distilled to remove the last traces of octanol.

Owing to the instability of TiOP at elevated temperatures, and the presence of sodium bodies, distillation of the ester in the vacuum still is not possible. It is therefore passed to a Swiss-made Luwa film still where the material is only at elevated temperatures for seconds, the ester being flashed off and the viscous

**Inspecting distillates on the new general purpose plant of Albright and Wilson (Mfg.)**

still bottoms being removed continuously. The wet octanol is dried in the atmospheric still.

**General Purpose Plant.** Chemicals developed through research are produced here. A highly flexible chemical 'Meccano' set, the unit represents a step between laboratory and commercial-scale production. Three small units have been completed, others will be installed. Present products are phosphonitrilic chloride, a resin intermediate with exceptional properties of temperature resistance, and two insecticides: tetraethyl-pyrophosphate (TEPP) and hexaethyl-tetraphosphate (HETP).

Although first made 80 years ago, Albright and Wilson's is the first commercial process for phosphonitrilic chloride. It is the reaction product of phosphorus pentachloride and ammonium chloride. The reaction is carried out in a medium of monochlorbenzene with the addition of zinc chloride as catalyst. The MCB is stripped off in the still and the $PNCl_2$ cast in trays.

For use in very high temperature resins, the product is of interest to the aircraft industry; there are promising applications in brake linings. It is stated that this class of resin will outlast phenol formaldehyde in terms of temperature.

Various other organic and phosphorus compounds of similar manufacture are also produced here. Some of the compounds are effective in forming complexes with metals, in catalysis, as plasticisers, and as anti-static agents with man-made fibres, etc. Products include acid butyl phosphate and methyl acid pyrophosphate. Production is to start shortly on tri-iso-butyl phosphate. Phosphorus-based resins are also in the experimental stage.

TEPP and HETP are made by the addition of $P_2O_5$ to triethyl phosphate. The dye saffranine and picoline are added to give a distinctive colour and smell.

**Technical Service Department.** This department, started 25 years ago, has five main sections: 1, water treatment (Calgon, filming amines); 2, food products (for aeration); 3, detergents (work includes fundamental research on the role of phosphates); 4, metal finishing (chemical and electrolytic polishing, electroplating); 5, miscellaneous (plastics, organotin compounds as stabilisers, Hetron resins, Kanigen plating, and new work on the use of phosphates in vitreous enamelling on aluminium).

In the metal finishing section work is in hand on a Duplex-Plusbrite process for car trims that is said to be cheaper than the normal plating process and to eliminate pre-polishing; copper pyrophosphate, a cyanide-free process; nickel sulphomate currently used for record stampers; and a new bright silver process that is under development.

# New Plastics Materials at Düsseldorf

*(Continued from page 643)*

Bayer 'Makrolon', a polycarbonate type which is still under development and which is at present being processed into electrical engineering goods, household goods and small industrial equipment and parts. It is possible, a Bayer spokesman told CHEMICAL AGE, that it will be able to be used for aerosol packages; at present, it is being worked into babies' feeding bottles, which are basically not a far cry from this. Two other new additions to the Bayer polycarbonate stable are the electrical insulating foils Makrofol N and Makrofol G.

*Polystyrene.* This plastics material was shown by six countries, including the U.K. The Shell companies and other exhibitors had high-impact-proof types on exhibition, while a new development was the foaming polystyrene Styropor of the B.A.S.F. company. This product—or range of products—consists of a polystyrene plus expanding agent, and is offered for the manufacture of exceptionally low-gravity, closed-cell expanded articles with a good chemical and water resistance, buoyancy and very low thermal conductivity.

Five exhibitors from three countries showed the under-development plastics material polyvinyl alcohol, the Mowiol brand of Hoechst, Vinavilol of Montecatini and the product of the Société d'Arendonk, of Brussels. This water-soluble material is to be made into packages not only for synthetic detergent, weedkiller and other consumer articles, but also has a wide future in laboratory technique when noxious substances have to be added to water.

*Reinforced plastics.* Another plastics product for use by the industry itself is the glass-fibre reinforced polyester container. One range of these, from the German Phönix-Rheinrohr AG concern, consists of tanks resistant to chemically corrosive substances and with capacities of up to 10,000 litres.

Apart from the starting resins and auxiliary chemicals which were shown by most of the major chemical producers and which included the new range of resins of the Reichhold-Chemie branch of the Reichhold group and a section of plastics-working and processing machinery and plant, the other main materials on show were as follows:

*Synthetic rubber.* On show by Shell group (Cariflex styrene-butadiene hot and cold rubber), I.C.I. (Butakon) and six German concerns including the new Bunawerke Hüls GmbH.

*Polytetrafluorethylene.* Nine companies from four countries displayed p.t.f.e. Three raw materials were on show: Fluor by I.C.I., Hostaflon TF by Hoechst and p.t.f.e. regenerates by the German Mikro-Technik GmbH. A large range of Teflon pipes, sheets and foils, as well as six branded p.t.f.e. products from the American Polypenco.

*Polytrifluoroethylene.* Shown by two manufacturers—Montecatini with Algoflon and Hoechst with Hostaflon C—and two German processors.

## *In Parliament*

### Aviation Ministry Takes Over Missiles, Weapons from M.o.S.

In reply to a written question on 30 October, the Prime Minister said that with minor exceptions, the Ministry of Aviation would take over the functions of the former Supply Ministry in respect of aircraft, guided weapons, ballistic missiles, atomic weapons, radar and other electronic equipment.

Other functions will be transferred to the War Office, which will be responsible *inter alia* for the bulk of the Royal Ordnance factories and for the greater part of the disposal of surplus service equipment. Certain functions may, however, be taken over by other departments and the final details have yet to be settled.

# *Ciba Clayton's Manchester Exhibition*

**L. to r. are E. Gasche (Ciba Ltd., Basle), W. Penn (Courtaulds Ltd., Coventry), J. G. Grundy (Ciba Clayton Ltd.) examining samples of textile dyeing and printing processes at the recent Manchester exhibition of Ciba Clayton Ltd.**

## Letters to the Editor

### D.C. Polarography

SIR,—On page 1029 of your issue of 20 December 1958, there appears an article which contains the statement, "The d.c. polarograph is still considered the most universally useful tool for chemical analysis, since it can be used for organic, inorganic, reversible and irreversible reactions."

While it is misleading in any scientific field to quote individual opinions as being those of the general body, what is even more misleading in this case is the implication contained in the reason for the supposed opinion.

In fact, cathode ray polarography is in international use for organic, inorganic, reversible and irreversible reactions, and pulse polarography, which is not yet commercially available, can also be used for the same purposes.

I believe it would be worthwhile informing your readers of the non-exclusive usefulness of d.c. polarography lest erroneous impressions be formed by them.

Yours, etc.,
W. B. HORNER
Southern Instruments Ltd.,
Camberley, Surrey.

### Office of the Lord Privy Seal

With the appointment of Lord Hailsham as Minister with general responsibility for science and technology, including atomic energy, the Atomic Energy Office and the Lord President's Office will be combined. The new office will be in the charge of Mr. F. F. Turnbull, C.B., C.I.E., whose appointment as deputy secretary, to succeed Sir Friston How in charge of the Atomic Energy Office, was announced some months ago. It will be organised in two divisions—(1) a General Division, under Mr. R. N. Quirk, under-secretary, corresponding to the previous Lord President's Office; and (2) an Atomic Energy Division, under Mr. M. I. Michaels, under-secretary, corresponding to the previous Atomic Energy Office.

### No Anti-dumping Duties on Tartaric Acid

The Board of Trade have decided that a case for imposing anti-dumping duties on tartaric acid imported from Italy, Spain and West Germany has not been made out. An application for the imposition of duties under the Customs Duties (Dumping and Subsidies) Act, 1957, had been under consideration since 24 April.

### Castleford Houses to Use Only Tanalised Timber

All council building at Castleford, Yorks, is to incorporate only Tanalith-protected timber. Two estates are already using it and a large new estate will also use Tanalith-impregnated timber. Some 650 houses are involved. Tanalith C, produced by Hickson's Timber Impregnation Co. Ltd., Castleford, is a stable chemical impregnated into timber under vacuum-pressure.

# New Committee will Consider Need for Applied Chemistry Institute

REPRESENTATIVES of technical colleges training students for the Higher National Certificate in Chemistry decided at a meeting held in Crewe on 17 October that either a new Institute of Applied Chemistry should be formed to cater for holders of the H.N.C. or that the Royal Institute of Chemistry should reconsider its decision not to open a permanent third grade of membership.

The meeting was called by the British Association of Chemists to consider setting up an Institute of Chemical Technology to cater for chemistry students who did not sit for the A.R.I.C.—the number was thought to be about 80% of the total. The R.I.C. professional status committee had been critical of the proposed title pointing out that many holders of the O.N.C. and H.N.C. entered one or other of the professional bodies catering for specialised fields of technology so that it was doubtful if any substantial number of students were not covered.

Sixty colleges were represented at the Crewe meeting. The Ministry of Education and the R.I.C. were both represented and about 20 B.A.C. members also attended.

There was general support for the R.I.C. committee's disagreement with the statement that 80% of H.N.C. chemistry students were not catered for. It was agreed, however, that some steps should be taken to cater for H.N.C. students.

A proposal that the meeting favoured establishing a new Institute of Applied Chemistry was carried by 24 votes to 23. A further proposal that the R.I.C. be asked to reconsider its decision not to open a permanent third grade of membership was carried by 35 votes to 8.

It was felt that the institute would offer part-time students who had reached H.N.C. in chemistry an alternative course to that of the R.I.C., leading to a qualification equivalent to the Dip. Tech. for day students.

A steering committee was formed of 12 representatives of technical colleges and six representatives of industry. The R.I.C. will be asked to make nominations to the committee, which will consider detailed proposals and make "the necessary decisions".

Mr. John Wilson, C.B.E., M.C., M.Sc., B.A.C. president, of 'Brunholt', 208 Bramhall Lane South, Bramhall, Stockport, Ches, is acting as hon. secretary. The new committee is independent of the B.A.C.

# *Structure of Phenol-Formaldehyde and Allied Resins Discussed at R.I.C. Meeting*

EARLY historical aspects of phenol-formaldehyde condensation and Baekeland's classical work which rendered such products of commercial value were considered by Dr. R. F. Hunter at a joint meting of the Royal Institute of Chemistry, London Section, with the Brighton Technical College Chemical Society, held at the College on 13 October. Fundamental distinctions between novolaks and resoles, and the dependence of the nature of the resin on pH and catalysts, were then referred to and then Dr. Hunter summarised the evidence for the accepted structure of novolaks as phenolic nuclei linked by methylene linkages in *o*- and *p*-positions to hydroxyl. Reference was made to the isolation of 2:2'-, 2:4'-, and 4:4'-dihydroxydiphenylmethanes as the 'building blocks' in resin formation and the dependence of molecular weight on phenol-formaldehyde ratio.

After emphasising that the work of the continental research schools of Zinke, von Euler and Hultzsch is based on the study of blocked derivatives which differ from the actual intermediates in phenol-formaldehyde polycondensation, Dr. Hunter described rational syntheses of a number of unblocked resoles by use of the lithium exchange reaction to give carboxydihydroxydiphenylmethanes with subsequent reduction by $LiAlH_4$, syntheses by way of halogen-blocked resoles with subsequent dehalogenation, and syntheses by way of application of the Kolbe-Schmidt reaction to give carboxydihydroxydiphenylmethanes.

The rational synthesis of several unblocked trinuclear novolaks has enabled their identification as isolable intermediates in resin formation and provided further confirmation of the general picture of novolak structure.

### A.B.C.M. 1959 Directory

The 1959 edition of the directory of the Association of British Chemical Manufacturers' Association, entitled 'British Chemicals and their Manufacturers', contains more than 12,000 products, named in accordance with B.S.2474/1954 (Recommended names for chemicals used in industry). Only the actual manufacturers are named against each entry. The directory also includes an alphabetical list of the association's member-firms. Copies are available, free of charge, to all persons or firms genuinely interested in the manufacture or purchase of chemicals. Enquiries should be addressed to the A.B.C.M. at Cecil Chambers, 86 Strand, London W.C.2.

### TV in I.C.I. Offices

The new I.C.I. Alkali Division offices at Northwich, to be officially opened next January, will contain a closed circuit television so that information may be passed visually between the old and new office blocks.

# Controlled Crystallisation of Sodium Chloride Using an 'Oslo' Crystalliser

NORMAL industrial production of sodium chloride in vacuum evaporators, with relatively uncontrolled nucleation and crystal growth, yields very small crystals (from 30-60 mesh); slow evaporation in large open pans, with either direct firing or steam coil heating, on the other hand produces large irregular crystals ('fishery salt'). This last process is uneconomic in fuel but attempts to grow large crystals in normal evaporators have always been unsuccessful.

Discussing controlled crystallisation of sodium chloride at the recent London meeting of the Institution of Chemical Engineers, Dr. F. Rumford and Mr. J. Bain of the Royal College of Science and Technology, Glasgow, C.1, reported that the introduction of the 'Oslo' or fluidised bed crystalliser, in which evaporation and crystal growth are separated, was investigated as a means of allowing a closer control of crystal growth to be established.

In the operating system of the Oslo crystalliser, crystallisers containing a definite weight of crystals in fluidised suspension can be fed with some specific number of nuclei which will grow to the desired size. A similar number of finished crystals are withdrawn as 'make', provided that further nucleation be kept to some very small figure, and that supersaturation be maintained at a constant level by the provision of fresh supersaturated solution as a fluidising liquid.

To operate the Oslo crystalliser, the limits of supersaturation at which nucleation rates become excessive, in Miers' 'metastable limit' have to be established while the actual rates of crystal growth under varying plant conditions must also be known. It may be necessary as well to establish the nature of the process governing growth rates.

## Crystallisation Process

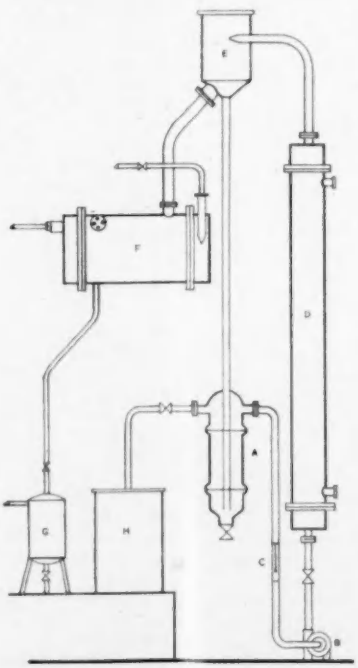
Rumford and Bain state that the process of crystallisation at 52°, 62° and 73°C has a similar activation energy as that for diffusion; the film thickness in crystallisation is of the same order as that present in solution; and the mass transfer coefficients calculated from dimensional correlation are of the same order as the experimental values.

Crystallisation at these temperatures must therefore be controlled by diffusion and not by a surface reaction, at any rate for the range of supersaturation used.

At lower temperatures than 52°C, dependence of rate of growth on supersaturation is more complicated, and suggests, these workers say, interference due to surface alignment. Such reactions would probably have a much higher temperature coefficient than the diffusion process. The negligible rates of growth noted for supersaturation levels below 0.48/l. may be due, it is believed, to some effective 'energy barrier' or to temporary blockage of active growing areas by impurities in the solution (pH of solution used was 7).

Small quantities of I.C.I. Cellofas B, sodium salt of carboxymethylcellulose, were added to the solution to give a concentration of 30 p.p.m. This concentration had a very small effect on the viscosity (0.5% increase) and hence on the diffusion rates.

*Semi-Technical Plant.* After operation of a laboratory ash crystalliser, a semi-technical plant was investigated. The crystal suspension was held in a 1 ft. dia. glass vessel (A), 4 ft. long. Air leakages, entrained by the liquid flow, rose to the top of the vessel where a tapping of the vacuum line removed gas as required. The pump (B) was a stainless steel Alfa-Laval centrifugal unit with an output of 40 gall./min. with a 5-ft. head. Solution flow was measured by extension of a previously calibrated spring float (C) and under operational conditions was normally 33 gall./min., equivalent to an upward velocity through the crystalliser of 3.4 cm./s. Heater (D) was a steam-heated tube-and-shell heat exchanger with stainless steel tubes 12 ft. long. Flash head (E) was of rubber-lined mild steel, 18 in. in diameter by 2 ft. long, the solution entered tangentially. The supersaturated solution flowed down to the crystalliser; separated vapour was condensed in a steel tube condenser (F) and collected (G). Saturated feed solution was sucked into the glass vessel under vacuum from rubber-lined mixing tank (H). Solution flow lines were either glass or rubber-lined steel. As the condensing system was inadequate a crystalliser temperature of 73% was chosen, with outlet heater temperatures of 80°-90°C.



The semi-technical plant

*Operating Details.* Crystals of 10-12 mesh (1.4-1.6 m.m.) are tipped into the crystalliser to give a fluidised bed 2-3 ft. deep. This bed is retained in the glass vessel during the crystallisation.

At a production rate of 32 lb./h., the mean retention time for a bed weight of 96 lb. is three hours, while the dominant crystal size is about 2 mm. The great bulk of crystal growth takes place around the liquid inlet.

Output of sodium chloride crystals from an Oslo crystalliser, it is suggested, is almost independent of bed depth, and can be expressed as output per square foot of crystalliser cross section.

When the inlet supersaturation of 1.6 g./l. was exceeded in an attempt to increase output marked nucleation occurred, Rumford and Bains found. Even at a rate of 32 lb./h. with the limiting inlet concentration some deposition of crystal at any irregularity in the downtake pipe or flash head.

Crystal quality has been found to be excellent when a proper bed of large crystals was present, but irregular masses of aggregates sometimes appeared when appreciable quantities of fines were circulating with the liquor. The top 20% of the crystal bed was noted as seeming to form a partly classified section of smaller crystals, with the remaining 80% evenly mixed and uniform.

It has been found impracticable to start with a saturated solution and evaporate till nucleation occurs. A milky white suspension containing very large numbers of nuclei forms which can flow through the plant for days before sufficient large crystals are obtained to form a proper fluidised bed. Therefore screened vacuum salt of 0.2-0.5 mm. is used as the original seed and added to the saturated solution.

To avoid flash nucleation supersaturation is restricted to below 1.6 g./l. under normal operating conditions (specific figure for sodium chloride). Any industrial sodium chloride crystalliser has some limiting output, which can be expressed in, e.g., lb./sq. ft. of crystalliser cross section.

*General Conclusions.* Crystal growth of sodium chloride can be controlled by fluid diffusion (above 50°-55°C) or by surface orientation rate (below 50°C) mass transfer rates of the order of 80 cm./h. can be obtained in a fluidised of 1-2 mm. size crystal. For controlled crystal growth, supersaturation must not exceed 1.6 g./l., and the ration of 'make' to suspended weight should not exceed 1 to 3.

When producing 8-10 mesh (2 mm.) crystals, the 'metastable limit' gives a possible production rate at 170°C of 40 lb./h. ft. 2 of crystalliser cross sectional area, with a crystal bed depth of about 2 ft. Finally, an Oslo crystalliser for sodium chloride should preferably be started with a bed of 1 mm. cubic crystals in the suspension vessel.

## New Ceramics from Aluminium Oxide

DEVELOPMENT of a new ceramic made from powdered aluminium oxide, which transmits light readily, possesses very high strength, withstands much higher temperatures than most ceramics now in use and which can be pressed, is reported by U.S. General Electric Co.

Called Lucalox, this polycrystalline material is said to have the composition of a ceramic, the structure of a metal and light transmitting ability approaching that of glass. Elimination of the microscopically small pores or bubbles that are usually found in normal ceramic materials is stated to have produced this result. It is thus possible to read through a sheet of Lucalox when it is placed flat on a piece of paper. At least 90% of the light in the visible spectrum is transmitted, G.E.C. claim.

G.E.C. consider that Lucalox will increase the range of uses of ceramics, and the range of instruments that are at present limited by the physical characteristics of available ceramics as, for example, high intensity incandescent and discharge lamps which are limited by the heat resistance of their transparent envelopes. Whereas fused quartz which is often used for high-temperature lamps, performs satisfactorily up to 1,800°F, Lucalox is stable to almost 3,600°F.

Other applications suggested for the new material are in infra-red lamps used for testing the heat-resistance of missile nose cones, as an electrical insulator and as a material for gem bearings in delicate equipment.

## Gas Cleaning Plant For Scotland

HEAD Wrightson Iron and Steel Works Engineering Ltd., a subsidiary of Head Wrightson and Co. Ltd., have received an order from Colvilles Ltd. for the supply and construction of a blast furnace gas cleaning plant at Ravenscraig in Scotland. The plant will mostly be manufactured by Head Wrightson at their works on Teeside.

This is an extension to a similar plant constructed by Head Wrightson two years ago at Ravenscraig and forms part of the extensive strip mill project which Colvilles are at present undertaking. The complete plant will be capable of cleaning 15,000,000 cu. ft. per hour of blast furnace gas and new equipment now to be supplied will comprise one gas washing tower and two Head Wrightson Research Cottrell wet tube electrostatic precipitators together with the necessary gas mains, valves, pumps, water mains, etc. Ancillary equipment will also be supplied for the handling and recovery of sludge from the circulating water system.

It is expected that the plant will be in commission by the middle of 1961. On completion, this plant will be the twelfth of this type to be supplied by Head Wrightson to the iron and steel industry during the last eight years. Value of this contract is approximately £357,000.

# New Automatic Method for Determining Insecticide Toxicity

A NEW chemical analysis system for determining inhibition of acetylcholinesterase by certain anticholinesterase insecticides was introduced on 12 October by Technicon Controls, Inc., Chauncey, New York, whose British counterpart is Technicon Instruments Co. Ltd., 26 Warwick Road, London S.W.1. The new development in automatic wet chemistry instrumentation was announced at a three-day meeting of the Association of Agricultural Chemists.

Developed to determine residual potency of such highly toxic phosphate ester insecticides as parathion and malathion, the new cholinesterase bio-assay employs the Technicon AutoAnalyzer, a system of continuous, automatic chemical analysis stated to eliminate time-consuming conventional analytical techniques.

While the test is not specific for a particular insecticide, the bio-assay method serves as a more exact index of resultant effect. Recent findings have shown, for example, that total effect of two different phosphate ester insecticide sprays in some cases exceeds additive toxicity effect as much as five times.

Among the most precise methods for the estimation of phosphate ester insecticide residues, researchers have found, are those involving inhibition of the enzyme cholinesterase, which is critical to the functioning of the insect's nerve cells. In addition, the generic bio-assay test employing the AutoAnalyzer becomes automatic once the crop extract is prepared.

Cholinesterase bio-assay is performed in two simultaneous stages. First, the insecticide and a standard solution of cholinesterase are mixed and incubated. During the incubation period, the insecticide residue will inhibit a certain amount of cholinesterase. Then the amount of cholinesterase remaining is measured by colorimetric means in a dynamic chemical analysis system.

Function of cholinesterase in the body is to split acetylcholine into acetic acid and choline. The acetic acid thus formed will lower pH approximately 0.5. In the bio-assay, the inhibited sample mixes with a phenol red pH indicator which changes colour from red to shades of yellow depending upon the concentration of acetic acid. The AutoAnalyzer measures concentration colorimetrically and automatically records the value.

The AutoAnalyzer 'automates' the six basic steps of an analytical procedure in wet chemistry—sampling, measuring of sample, mixing and separation, reaction, analysis, and recording of results—and completes them in minutes. Results are obtained continuously without an attendant being present, and, it is reported, that they can be reproduced with an amazing degree of precision. The system is self-cleansing, so that each sample remains uncontaminated. Sample, size, time, and temperature are constant, and the unknown is checked against a continuous stream of standard sample. Determinations are accurate down to parts per billion.

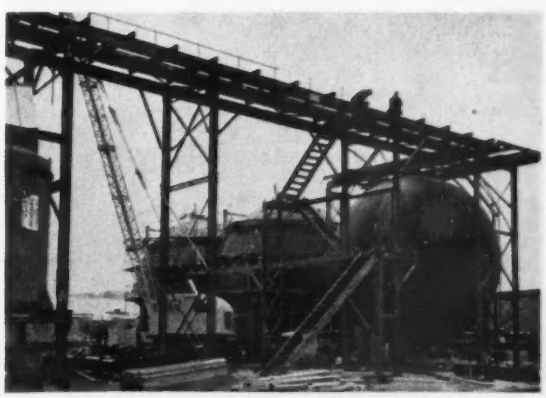
## New B.S. for Laboratory Potentiometric pH Meters

A NEW British Standard for Laboratory potentiometric pH meters (B.S.3145 1959) specifies performance requirements. In due course it will be complemented by a specification for deflection pH meters.

Among the performance requirements specified are those for calibration of the scales, sensitivity, stability and input current. Other requirements include those for the temperature compensating device, auxiliary pH control, connexion to the glass electrode, and for screening.

Copies of this Standard may be obtained from the British Standards Institution, Sales Branch, 2 Park Street, London W.1, price 3s (postage extra to non-subscribers).

## *Progress at I.C.I.'s New Intermediate Oxidation Acid Plant*



**The three main ammonia storage vessels and other sections of the new intermediate oxidation acid plant of I.C.I. Nobel Division at Ardeer. It is hoped that the unit will be commissioned during the second quarter 1960. (See C.A., 31 October, p. 610)**

# S.A.C. Paper on Determination of Beryllium Metal in Air

PRIMARY precaution to be taken when handling the highly toxic beryllium metal depends on good ventilation of the working area and to check effectiveness of the ventilation, methods for determining submicrogram quantities of beryllium are required. This was stated by R. J. Powell, P. J. Phennah and J. E. Still (General Electric Co. Ltd.) in their paper, 'The determination of beryllium metal in air', presented at a meeting on atmospheric pollution analysis held by the Society for Analytical Chemistry on 7 October. Mr. R. C. Chirnside, chief chemist at the G.E.C. research laboratories and S.A.C. president, was in the chair.

Sampling is effected by drawing a known volume of air through a filter paper held in the head of a special air sample. Samples are of three types: specific samples are taken from positions in the immediate vicinity of an operation involving beryllium; background samples are taken at the same time at a distance of at least 5 ft. from the operator towards the centre of the working area; environmental samples are taken each day from the exhaust stack of the ventilation system.

The filter paper is removed from the sampler and placed in a cellulose envelope for transport to the laboratory. The envelope and paper are submitted to a wet oxidation process. Subsequently the beryllium is co-precipitated with calcium phosphate, the precipitate being redissolved in a small volume of acid; gold is added to act as an internal standard in the subsequent spectrographic determination of the beryllium.

The porous cup technique is used and spark circuit conditions are chosen to give maximum sensitivity. The method has been shown to be satisfactory over the range 0.015 $\mu$g-50 $\mu$g Be/ml of the test solution. A Hilger medium spectrograph is used with direct-reading attachment; the total time for testing 20 samples is about 4½ hours.

Other papers given at the meeting were: 'Analytical aspect of the control of industrial atmospheric contamination', by Dr. J. C. Gage (I.C.I. Industrial Hygiene Research Laboratories, Welwyn); and the 'The determination of atmospheric polycyclic hydrocarbons', by B. T. Commins (M.R.C. Group for Research on Atmospheric Pollution, St. Bartholomew's Hospital, London E.C.1).

# *Radiochemistry Produces Phenylic Acid Via Direct Oxidation of Benzene*

THE Physical Chemistry Institute of the U.S.S.R. Academy of Sciences has been making a study of the nature of ion exchanges in the soil, using for this purpose labelled atoms. One of its conclusions is that rare earth elements are better implanted in the soil than alkaline earth elements.

This was stated at a conference on the peaceful uses of atomic energy held at the Nuclear Physics Institute, Tashkent, and attended by about 1,000 scientists.

The Russians claim to have evolved 50 new measuring instruments for the automatic control and regulation of complex industrial processes with the help of radioactive isotopes. For example, Uzbek scientists have designed a radioactive regulator which can be used to determine the level, density and other qualities of chemical solutions, liquids and dry mixtures. They have also developed automatic regulators which are being used in the production of mineral fertilisers, rubber, etc.

Using tracers to study plant nutrition, Uzbek scientists have evolved what is claimed to be a new 'horizontal screen' method for introducing phosphoric fertiliser into cotton plantations. Phosphorus is introduced in two layers—one near the surface and the other at the bottom of the furrow. The fertility of the cotton plant is thereby increased. With the help of tagged atoms the phosphorus metabolism of cotton in varying conditions of water supply during the blossoming time was studied. It was found possible to determine the quantity of fertiliser needed in relation to the moisture of the soil.

One of the reports submitted to the conference claims that strontium-90, cerium-144, promethium-147, and ruthenium-106 have all been obtained by electrolysis of compounds of rare earth elements in water and alcoholic acetone solutions, with platinum and stainless steel. Satisfactory results under commercial testing conditions have been reported with sources of radioactive irradiation obtained by this method. The elements have been used to remove electrical charges in spinning plastics fibres, etc.

The Karpov Institute of Physics and Chemistry in Moscow announced the construction of a number of new powerful gamma units for use in complex radiation chemistry processes. The institute has also designed a unit for radiation chemistry processes occurring in a liquid phase.

What is claimed to be a basically new method is direct benzene oxidation in the presence of water radiolysis products. The first models of the radiation chemistry unit at the Karpov Institute were used to produce phenylic acid through direct oxidation of benzene. Tests of the unit are reported to have shown that it could produce up to 10,000 tons of chemicals a year, using various models of radiation chemistry apparatus.

## Capillary for G.L.C. Now Produced in Glass

CAPILLARY columns for use in gas chromatography were first described by Golay in the autumn of 1957 (**1**). The first practical chromatograms which he showed the following spring (**2**) aroused considerable interest and a period of intensive development has since taken place. In combination with the new ionisation detectors, e.g. argon and hydrogen flame; they have revolutionised the analytical capabilities of gas chromatography and their potentialities in many industries are now being investigated (**3**).

Although both metal and plastics tubes have successfully been employed for the columns, D. H. Desty and his co-workers at the BP Research Centre have developed a method of drawing long lengths of coiled glass capillary (**4**) which looks very promising particularly at high temperatures. By arrangement with BP Research Centre, A. D. Wood, scientific glass makers, 145 Skinner Street, London E.C.1, are now producing the spirals commercially, and are now able to offer this tubing from stock, with an internal diameter of 10 thou, and an external diameter of about 35 thou. in continuous lengths up to 500 ft. Other sizes are available to special order.

At the moment A. D. Wood are only supplying the glass spiral, but in the near future they hope to be able to supply complete columns mounted on a simple metal framework with rigid inlet and outlet ready for coating.

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(3) DESTY, D. H., GOLDUP, A., and WHYMAN, B. H. F. To be published in *J. Ind. Petroleum*.

(4) DESTY, D. H., HARESNAP, J. N., and WHYMAN, B. H. F. To be published in *Analytical Chemistry*.

(Preliminary announcement of Refs. (3) and (4) given in *Nature*, 1959, *184*.)

## 3300 kW Silicon Rectifier For Chlorine Production

WHAT is thought to be the largest silicon rectifier equipment made in this country has just been completed by Westinghouse Brake and Signal Co. Ltd., Yorkway, London N.1, and is being shipped to India to provide current for electrolytic cells producing chlorine and caustic. The rectifier plant, which uses silicon diodes made in the Chippenham Works of Westinghouse, is rated at 27,500 amperes at 60-120 volts d.c., and comprises a regulator and transformer connected to the 22 kV system, a water-cooled silicon rectifier, and a control cubicle with automatic adjustment of the d.c. current—so that the rate of production of chlorine is maintained constant.

The rectifier is extremely compact, a floor space of 57 sq. ft. being required for each of the two cubicles—which could be uprated to double the operating voltage by selecting silicon diodes withstanding 1,000-1,200 V peak.

Overseas News

# CHEMICAL OUTPUTS OF ISRAELI STATE DEVELOPMENT COMPANIES

MR. M. BADER, Israel's Director-General, Ministry of Development, has submitted a table (showing the growing strength of the Government Development Companies) to the Ministry's Technological Advisory Board. According to this table, output in tons of material per worker in respect of phosphates was 981 for 1958/9 (a 40% increase over 1957/8, when the figure was 698); for potash, the output was 228 tons in 1958/9, as against 185 tons in 1957/8—a 23% increase; and, for fertilisers, 319 tons in 1958/9 as compared to 310 tons the previous year, or 3% more.

According to the board's survey of the progress in the exploitation of Israeli minerals, Fertilizers and Chemicals Co. have kept their production plants working efficiently and, in many cases, well in excess of designed capacity. Establishment of the plants and services connected with doubling the company's nitrogen facilities proceeded on schedule or better, and considerable effort has been directed to improving the efficiency of existing plants and processes.

The board's visit to the Dead Sea Works at Sodom amply confirmed the impression the board gained from discussions, of good management and sound production. Plans for increasing the area for evaporation will be completed shortly, the objective being an annual production of at least an additional 350,000 tons of potash. Bromine production has reached the rated capacity of the plant, i.e. 2,000 tons of bromine per annum. The combination of the potash and bromine companies has led to the reduction of administrative costs below their former level.

The board said it was impressed by what it had seen at the Phosphate Works, Oron. Production is running at a figure of 210,000 tons per annum, about 10% higher than that of the previous year.

## World's Largest Urea Plant?

The Italian Ansaldo Co. have obtained an order from the Indian Government for a $21-million plant for the production of 160,000 tons yearly of urea with 46% nitrogen content. It is claimed that this plant, designed in co-operation with Montecatini, will be the largest of its kind in the world. It will consist of three sections; synthesis of ammonia plant; synthesis of urea plant; and a power station that will utilise local lignite.

## Houdry Develop Dual Purpose One-step Catalytic Process

A dual-purpose one-step catalytic process for purification and dealkylation of aromatic light oils has been developed by a U.S. company. Avaliable for general licensing the process is said to be of particular interest to coke oven operators for processing of aromatic light oils to obtain benzene, toluene, and xylene to meet the purification specifications required by users of aromatic products. It is claimed that the purified benzene obtained from the Litol process typically contains less than 1 p.p.m. of phiophene and has a freezing point of 5.4°C or higher.

The Houdry Process Corporation, Walnut Street, Philadelphia, partly responsible for development of the process, claim elimination of the need for a second step involving either aceotropic distillation or solvent extraction. This same Litol process is recommended for dealkylation of toluene, xylene or higher aromatics from sources other than coke oven light oils to produce high quality benzene or other more valuable aromatic products.

## Progil-Bayer-Ugine to Produce Chemicals in France

Progil-Bayer-Ugine, the new Franco-German chemical firm has now been formed. The new company will have a capital of 250 m. francs, subscribed by Farbenfabriken Bayer, their Canadian subsidiary Bayer Foreign Investments, and two French chemical concerns Ugine and Progil. Offices of the new company will be in Paris and a factory is to be built near Grenoble for the manufacture and distribution of isocyanates, polyesters and polyethers for adhesives and varnishes.

## Shell Pernis Rubber Plant on Stream in New Year

Production at the new synthetic rubber plant of Shell Pernis Chemische Fabrieken N.V., now nearing completion outside Rotterdam, will start early next year. The plant being built at a cost of over £11 million, comprises two raw material plants, a polymerisation plant and a tank farm covering 42 acres. Capacity will be 50,000 tons of oil-based synthetic rubber a year.

## C.I.L. Set-up Paint Subsidiary in U.S.

Canadian Industries Ltd. have formed a wholly owned subsidiary to manufacture and market finishes in the U.S. The new company, C-I-L Paints Inc., has established plant and office facilities at Cincinnati, Ohio, to produce and sell Dynakota.

## B. A. Shawinigan to Raise Quebec Phenol Capacity

B. A. Shawinigan Ltd. are proceeding immediately with a 20% expansion in the capacity of their phenol plant in Montreal East, Quebec. The expansion, which will ensure sufficient capacity to supply Canadian demand for some years to come will be completed by the spring of 1960. Apart from its industrial uses it is one of the raw materials for Bisphenol A, which B. A. Shawinigan began producing in September 1959 for the production of epoxy and polycarbonate resins.

## Merger of Two U.S. Plant Construction Companies

Two well-known U.S. plant construction companies—Chemical and Industrial Corporation, Cincinnati, Ohio, and Chemetron's Girdler Construction Division—are combining operations. C. and I. will be the parent company; Girdler Construction the subsidiary.

C. and I. design and build plants for the fertiliser industry, e.g. Prayon process, nitric acid, ammonium nitrate units, etc.; Girdler Construction produce $CO_2$ and $H_2S$ plants and processes for the removal of these gases and plants for p.v.c., polythene, synthetic rubber, acetylene, etc.

## International Centre for Polymer Chemistry

A Camil Drefus Laboratory, in memory of Dr. Camil Dreyfus, founder and first president of the Celanese Corporation of America, is to be set up at the new Research Triangle Institute in North Carolina, with a grant of $2.5 million from the Camille and Henry Dreyfus Foundation. It will provide an international centre for polymer chemistry.

## Brazil's First Isopropyl Alcohol Now on Sale

The petrochemical installations of the Companhia Quimica Rhodia Brasileira at Campinas are now on stream and the company is offering for sale for the first time in Brazil isopropyl alcohol from a petrochemical source, as well as pure acetone, isopropyl acetate, isopropyl ether and mesityl oxide.

## Spanish Calcium Carbide Plant to be Expanded

A programme of expansion and modernisation at their Guardo, Spain, factory for the production of calcium carbide under licence from Wacker-Chemie, West Germany, is to be carried out by the Union Española de Explosivos S.A. Annual capacity for calcium carbide is expected to reach 100,000 tons. A new plant for water electrolysis, using British equipment, is expected to come into operation by the end of this year.

## Sincat Produce Italy's First Potassium Fertilisers

Sincat have started the production of potassium sulphate (40%-50%) utilising potassium minerals discovered in Sicily, a development that will preclude the need to import potassium fertilisers.

Sincat have initiated the production of ammonia, partly for their own use and partly for the Montecatini-Akragas plant at Porto Empedocle.

At the end of the year, Montecatini's

plant at Castelfranco will also start producing ternary fertilisers based on local raw materials.

## Merck Produce Chlorothiazide at Haarlem Subsidiary

Considerable additions have been made to the factory at Haarlem, Holland, of Merck Sharp and Dohme Nederland N.V. The new plant will be used for the manufacture of a new product, Chlorothiazide, to be exported to European and Near Eastern countries. The extension required an investment of Fl.3.5 million (£330,000).

## Hindustan Antibiotics Expand

The Indian State pharmaceutical company Hindustan Antibiotics Ltd., who operate the largest penicillin factory in Asia with an annual capacity of 40 million megaunits, are to expand their plant, which lies near Poona. Installations are now being erected, at a cost of Rs.17 million, for the production annually of 40,000 kg. of streptomycin and 45,000 kg. of dihydrostreptomycin. Work is proceeding with the aid and advice of Merck and Co., U.S. Before the end of 1961 it is expected that a further plant will be added for the annual production of 25 tonnes of antibiotics of the Tetracyline group.

## Fertiliser Plant Planned for Angola

A sum of about £835,000 has been granted for the building of a fertiliser plant in the Portuguese African province of Angola under the province's second development plan. The plant, with a daily output capacity of 180 tonnes of ammonia, is owned on a concessionary basis by the Companhia de Azotados de Angola.

## German Caustic Soda Output Recovers from 1958 Level

Last year West German chlorine output fell by 4% on 1957, to an annual total of 540,000 tonnes. Sales on the free market also fell during the period; the share of chlorine producers who process the material further in their own plants rose to 75%. Only 4,600 tonnes of chlorine was imported and a negligible amount exported.

Another fall on 1957 production totals was recorded for caustic soda, where output last year decreased by 2% to a total of 635,000 tonnes. This falling-off was due mainly to the recession in branches of the textile industry. Exports, however, rose over the year by 12% to a total of 68,000 tonnes; imports of caustic soda also went up but still account for only 1% of combined West German sales. Production, however, rose again sharply in the first half of 1959—by 8% on the same period of last year to 334,900 tonnes.

## Shell Produce Canada's First Odourless Solvent

An odourless solvent, Shell Sol 715, is being produced in Canada for the first time by Shell Oil Co., of Canada. Estimated present value of the Canadian market is $500,000 a year. The new product can be used as a carrying agent in aerosols, such as insecticides and charcoal in lighter fluids. Priced from 3 to 4 cents a gall. cheaper than the imported product, it is being made at Shell's Montreal East petrochemical plant.

## Thyssen to Supply Plant for Costa Rican Fertiliser Plant

The Financiera Agricola Industrial S.A. are planning the erection of a fertiliser plant with an annual capacity of 200,000 tonnes per year in Costa Rica. The cost of the project is set at $20 million. The plant would be built by the Industrial Chemical Co., Cincinnati, with plant and equipment from Thyssen AG, Düsseldorf.

## Caustic-Chlorine Plant to be Built in Peru

The Export-Import Bank, Washington, D.C., have authorised credits of $1.3 million to Alcalia Peruanos, S.A., to assist in setting up a new chemical plant. Of this total, $840,000 will be used to purchase machinery and services in the U.S. for the production of caustic soda and chlorine; the remaining credits will finance purchases in Peru for the plant that is to be built near Paramonga.

Repayment is guaranteed by Sociedad Agricola Paramonga Ltda., Lima. Both Peruvian companies are subsidiaries of W. R. Grace and Co., New York. The new plant marks the first step in the Grace Co.'s programme to meet Peru's needs for basic alkali and chlorine derivatives. It is scheduled to be in operation in the first half of 1960 and will have an initial daily capacity of 25 tons of rayon-grade caustic soda, 22 tons of chlorine and 2 tons of bleaching powder. These capacities will be increased 100% by 1963. An additional product will be hydrochloric acid. Ultimate cost of the project will be more than $8 million.

## Poland's New Phenol Plant

According to a Board of Trade Report, a large phenol plant is under construction at Bydgoszcz, Poland. Part of it is already operating and is producing between 100 and 200 tons of phenol a month, it is reported. It is planned to produce eventually 13,000 tons a year. The plant will use local raw materials.

## Polyester Fibres in Formosa

The China Artificial Fibre Corporation, Formosa, are to build a plant for the manufacture of synthetic fibres on a polyester basis. The plant, which will be erected with U.S. help and equipped with West German plant, will have an initial annual production capacity of 1,000,000 lb.

# *Oil Purification: Selective Absorption Versus Catalytic Hydrogenation*

To eliminate acetylene in high-purity ethylene for polymerisation purposes, two methods of purification have been practised. The more usual way is that of catalytic hydrogenation, but according to a recent paper delivered to the American Institute of Chemical Engineers Kansas City meeting by H. C. Schutt, consulting engineer, absorption of acetylene should be carried out using a selective solvent. Selective absorption was used during the early days of the petrochemical industry.

Main advantage, states Schutt, is that acetylene removal by extraction is economical. Considerable equipment is required in the hydrogenation method not only in the process but for regenerating the catalyst, so that investment and operating costs tend to be high, particularly for small plants.

Selective absorption on the other hand means a small plant, low temperature operation on the concentrated ethylene stream, and use of the same refrigeration system needed to remove propane from the ethylene stream in the primary ethylene recovery given.

There are no difficulties with regard to a solvent for the absorption system. Schutt suggests acetone as the best of the more volatile materials suitable for a low temperature system. Among the less volatile materials that could be used if acetylene is to be recovered is dimethylformamide.

An absorption system to yield 100,000 lb. per day of 97.5% ethylene would not cost more than £175,000, Schutt's estimates, if it is installed at the same time is the rest of the plant is built. Extraction costs would be 0.17 cents per lb. ethylene. With a 250,000 lb. per day plant the cost would drop to 0.11 cents, he considers.

In favour of catalytic hydrogenation for olefin purification are W. R. Gutmann *et al*, of Catalysts and Chemicals Inc., U.S. The method has been accepted and recent improvements coupled with industrial practice provide economical advantage.

Use of hydrogenation in propylene production has also been investigated by this company. Results are stated to be good, although propylene purification presents more problems than ethylene. Carbonyl sulphide tends to concentrate in the $C_3$ fraction and so has to be removed together with acetylene and propadiene.

Two separate catalyst systems have been found to work better than a single catalyst. Catalysts which work best on carbonyl sulphide are ineffective for promoting hydrogenation of methyl acetylene and propadiene. Conversely, catalysts effective with methyl acetylene and propadiene do not give good conversion of carbonyl sulphide. Either the noble metals and metals of easily reducible oxides give good results on methyl acetylene and propadiene, the noble metals acting best at low temperatures and low sulphur concentrations. The reverse is true of the reducible oxides. For carbonyl sulphide the reducible oxides are effective and give good results.

# PEOPLE in the news

● **Mr. I. J. Bowler** has been appointed a director of Constructors John Brown Ltd., C.J.B. House, Eastbourne Terrace, London W. He is at present resident in Iran and will return to the U.K. in 1960.

● **Mr. A. Peter Dickson,** formerly sales manager, has been appointed general manager of the pharmaceutical sales division of Bayer Products Ltd., Kingston-on-Thames. He is responsible for sales and promotion in the U.K. and Eire.

● **Mr. C. B. Bolland** has been appointed a director of Laporte Acids, the Sheffield Chemical Co. and James Wilkinson and Son, all subsidiaries of Laporte Industries. Mr. Bolland has relinquished his appointment as director of Laporte Chemicals, another subsidiary. **Mr. B. H. Oldfield** and **Mr. E. O. Rounsefell** have been appointed directors of Laporte Chemicals.

● **Dr. Aaron King** of the crystallography laboratory, at Birkbeck College, London University, has received a grant of about £990 from the Rockefeller Foundation of New York to enable him to visit centres of X-ray crystallography and research in the U.S. **Dr. J. G. Morris,** Oxford University, has received a Rockefeller fellowship tenable in the U.S. for research in chemical microbiology.

● **Mr. S. H. W. Pert, M.C.,** who has been managing director of Bowmans Chemicals Ltd., Moss Bank Works, Widnes, for the past 30 years, having now reached retiring age, has relinquished that post and resigned from the board with effect from 31 October. **Mr. M. H. M. Arnold, B.A., B.Sc., LL.B., F.R.I.C., A.M.I.Chem.E.,** who joined the company as technical director at the beginning of 1958 has been appointed managing director with effect from 1 November.

S. H. W. Pert

M. H. M. Arnold

● **Mr. S. N. Barford,** senior buyer of the construction engineering department in London of Laporte Chemicals Ltd., has been appointed raw materials buyer at the Luton Works in succession to the late Mr. R. S. Harden.

● **Dr. Erich Pohland,** who was elected chairman of Eurochemic last July, has now been appointed general manager of the company. This was recently announced at a meeting of the board of directors held at the offices of O.E.E.C. European Nuclear Energy Agency, when appointment of **Dr. R. Rometsch** as research director of Eurochemic was also proclaimed.

● **Mr. David E. Webb** has been appointed a director of Hickson and Welch (Holdings) Ltd., chemical manufacturers, Castleford, Yorks.

● **Mr. Arthur Lloyd Davies,** works manager of I.C.I. Alkali Division's Lostock Works, Northwich, since 1955, has retired. He joined Brunner Mond and Co. in 1925 and three years later was appointed works manager of Middlewich Works. In 1953 he led a division technical mission to Mexico City and shortly after his return was appointed works manager of Lostock Works. He is being succeeded by his deputy, **Mr. Henry Mills Spittle,** who joined I.C.I. in 1929. In 1947 Mr. Spittle became a plant manager at Winnington Works and four years later moved to Wallerscote Works, where he was subsequently appointed deputy works manager. In 1953 he moved to Lostock Works as deputy works manager.

● **Mr. R. E. Parker** and **Mr. P. Fabri** have been appointed by Kaylene (Chemicals) Ltd., Waterloo Road, London N.W.2, to cover the London area territory on retirement of the firm's London representative, **Mr. P. W. D. Thurley.**

**I. V. L. Ferguson, chairman and managing director of Evans Medical Ltd., who completed 40 years with the company on 15 October, receives from L. Chrimes, secretary, a George III silver tankard made in 1764 that was presented by the managerial staff to mark the occasion**

● **Dr. Ludwig Losacker,** former executive manager of the Chemical Employers' Joint Association of the Federal German Republic (Arbeitgeberverbände der Deutschen Chemischen Industrie, Wiesbaden), has been appointed managing director of the German Institute of Industry, Cologne.

● **Mr. John F. Gates,** regional director for Central and Southern Africa, Cyanamid International, has been appointed regional director, Africa, with headquarters in Rome. He joined Cyanamid in 1925 and was managing director of Cyanamid of Great Britain during the war.

Mr. Gates, who was also a former manager of Cyanamid International's mining chemicals department, will study Cyanamid's expansion programme in his territory and will advise on general developments and trends in Africa.

● **Mr. Christopher C. F. Laidlaw,** Hamburg, has joined the board of B.P. Benzin und Petroleum AG., the oil and petrochemical subsidiary of British Petroleum, to succeed **Mr. John D. Thurn,** who is resigning owing to pressure of work with the parent company in London.

● To ensure maintenance of their high standard of reliability in all future instruments, **Mr. Anthony Cockle** has been appointed reliability engineer for the Solartron Electronic Group Ltd., Thames Ditton, Surrey. Mr. Cockle has been engaged in guided weapon reliability engineering from 1956-59 at Vickers-Armstrongs (Aircraft) Ltd. and E.M.I. Electronics Ltd.

# DIARY DATES

**MONDAY 9 NOVEMBER**

**R.I.C.**—London: Woolwich Polytechnic, Thomas St., S.E.18., 6.45. pm. 'The search for new drugs' by Dr. F. L. Rose.

**WEDNESDAY 11 NOVEMBER**

**B.A.C.**—London: The Wellcome Inst., 183, Euston Rd., N.W.1., 7 p.m. 'Automatic control in the chemical industry' by B. W. Balls, and A. H. Isaac.

**Inst. Gas E. with Coke Oven Managers' Assoc.**—London: Lecture Theatre, Inst. of Civil Eng., Gt. George St., S.W.1., 2.30 p.m. 'First year at the coke research centre' by G. W. Lee.

**O.C.C.A.**—London: Manson House, 26, Portland Place, W.1. 7 p.m. 'Whiting dispersions, particle packing and surface adsorptions' by R. R. Davidson.

**Plastics Inst. with R.I.C.**—Southampton: The Chemistry Dept., The University, 7.30 p.m. 'Inorganic polymers' by F.G.R. Gimblett.

**R.I.C.**—London: Croydon Technical College, Fairfield, Croydon, 7 p.m. 'The silicones' by Dr. F. C. Saunders.

**R.I.C.**—Manchester: Manchester College of Science and Technology, 7 p.m. 'Magnesium' by Dr. S. J. Fletcher.

**S.A.C.**—Birmingham: Mason Theatre, The University, Edmund St., 6.30 p.m. 'The identification and determination of phenols' by Dr. L. Barker.

**S.A.C. with R.I.C.**—Glasgow: Room 24, Royal College of Science and Technology, 7.15 p.m. 'Techniques in radiochemistry for analysis and research' by D. A. Lambie.

## Boots Research Centre

The new biological research centre of Boots Pure Drug Co. Ltd. in Nottingham, built at a cost of nearly £800,000, is now fully occupied. It is the company's largest laboratory building.

# Commercial News

- **Evans Medical Propose Share Increase**
- **McKechnie Bros. Pay 5% Bonus**
- **Dow Three-Months Income Doubled**
- **I.C.I. and Howards Sell Thorium Ltd.**

### Evans Medical

An extraordinary meeting of Evans Medical will be held on 18 November to increase capital by £300,000. If approved the board proposes to offer 1,200,000 5s ordinary shares to holders in the proportion of three-to-ten.

### L. B. Holliday (Holdings)

Group trading balance of L. B. Holliday (Holdings) Ltd., aniline dye manufacturers, for the year to 30 June 1959 is £367,325 (£300,790). Net profit is £131,166 (£88,058) after depreciation of £55,620 (£57,040), and tax of £142,651 (£118,170).

### McKechnie Brothers

In addition to maintaining the 15% dividend for the year to 31 July 1959 on the ordinary and 'A' ordinary capital with a final of 10%, McKechnie Brothers, manufacturers of non-ferrous metals and chemicals, announce a special 5% (nil) tax-free distribution out of non-taxable profits.

Group profits have improved sharply from £527,609 to £943,834, and after a tax charge of £326,783 (£281,002), the net profit is up to £617,051 from £246,607. The 1959 profit includes an approximate gain of £135,000 in metal values, against a previous loss of approximately £125,000.

### British Alkaloids

Interim dividend of British Alkaloids, manufacturers of T.C.P. of 1.2d per 1s share is being paid in respect of the year ending 31 March 1960 (same). Sales for the first half year show a satisfactory increase in relation to those for the same period of 1958, it is reported. Turnover in the second half of the year is expected to be influenced by weather conditions.

### Dow Chemical

Net sales of the Dow Chemical Co., Midland, Michigan, U.S., for the three months ended 31 August totalled $191.68 million ($157.21 million). Net income was $22.33 million ($11.18 million).

Dow Chemie, of Basle, a subsidiary of U.S. Dow Chemical Co., will issue a Sw.Frs.60 m. 12-year 4½% loan.

An underwriting syndicate headed by the Union Bank of Switzerland will offer the loan for public subscription up to 9 November at 99.40 plus 0.60% for half the Swiss security stamp.

### Dynamit-AG

Dynamit-AG (formerly Alfred Nobel und Co.), Troisdorf, West Germany, are to pay a dividend of 14% (12%) on a net profit of DM.6,720,000 (about £560,000). Turnover for the current financial year should be higher than the 1958 figure of DM.544 million (£46,340,000), particularly in the field of plastics, where production will rise by such a degree as to send up plastics revenue by from 10% to 15% over the year.

### Thorium Ltd.

Producers of most of the U.K. thorium oxides and salts, Thorium Ltd., who have works in Lancashire, have been acquired from the joint owners, I.C.I. and Howards and Sons, Ilford, by Dow Chemie AG, the Swiss subsidiary of Dow Chemical, Midland, Michigan, U.S., and Rio Tinto of London. The agreement was due to be signed on Tuesday this week. Thorium also produce cerium compounds, particularly cerium oxide for use in optical polishing powder.

### National Distillers

Declared dividend of National Distillers and Chemical, U.S., is 30 cents on common. Third quarter earnings equal 58 cents (44 cents) a share, and for the nine months is equal to $1.65 ($1.32).

### Phillips Petroleum

Indicated earnings for the third quarter of Phillips Petroleum Co., U.S., are 70 cents (62 cents) a share. Profits for the first nine months of this year total $77,386,194 ($57,609,292) or $2.25 ($1.68) a share. Gross income totals $882,047,767 ($776,708,447).

### Standard Oil

Based on a nine months estimate, Standard Oil Co. of New Jersey, U.S., indicate third quarter earnings of $162 million ($146 million); or 75 cents (71 cents) a common share. For nine months consolidated earnings are estimated at $477 million ($395 million), or $2.22 ($1.93) a share.

### Soc. Ugilor

The coal-chemical company Société Ugilor, owned by Houillères du Bassin de Lorraine and Ugine of France, are to raise their capital from Frs.500 million to Frs. 2,000 million. Reason for the large increase is the expansion of the Ugilor chemical plant at Saint-Avold.

### NEW COMPANIES

C.L.D. LTD. Capital £25,000. To produce, sell, purchase, import chemical industrial and other preparations and particularly synthetic resins and products manufactured therefrom, etc. Directors: G. Heimann and P. W. Moss. Reg. office: 7 Great Winchester Street, London E.C.2.

R. A. STEPHEN AND CO. (HOLDINGS) LTD. Capital £100. To develop and turn to account the uses of radioactivity, radioactive and stable isotopes, etc. Reg. office: 18 Austin Friars, London E.C.2.

TOXIC PRODUCTS LTD. Capital £5,000. Chemical manufacturers, exporters, importers, merchants, etc. Directors: C. L. J. Chapman, L. J. Chapman and N. V. Barton. Reg. office: 48/50 Uxbridge Road, London W.5.

WALSALL CHEMICALS LTD. Capital £2,000. To carry on the business of inventing, making and vending chemical substances, etc. Director: Derek P. Taylor. Reg. office: Phipps (Packaging) Ltd., Middlemore Lane West, Redhouse Industrial Estate, Aldridge.

## Market Reports

## MORE ACCENT ON FORWARD BUYING

**LONDON** A steady home demand for industrial chemicals has been reported with buyers giving more attention to forward needs. The flow of export enquiries is also keeping up to a satisfactory level. Prices in most sections have continued steady to firm, the only notable exceptions being a reduction of £12/ton in the prices of *n*-butyl alcohol, and a further rise in zinc oxide, the red seal now being quoted at £109 10s/ton.

More activity is noted in fertilisers, while business in coal tar products has followed a steady course with a good movement in creosote oil, cresylic acid and pitch.

**MANCHESTER** A steady movement of heavy chemical products is reported to consumers in Lancashire and the West Riding. Contracts generally are being steadily drawn and fresh bookings are coming forward satisfactorily. Demand for a wide range of both light and heavy chemicals for export is well maintained. Prices generally have continued firm. In the aggregate there is a fair call for fertilisers including basic slag and the compounds.

**SCOTLAND** The report for the past week from most sections of industry in the Scottish market has been one of continued activity. Apart from the basic heavy chemicals which again featured well, demands did extend to quite a varied range of industrial chemicals. Enquiries for both immediate and forward requirements have been prominent. In regard to quantities, these have been well maintained and showed little change. On the whole prices have showed a tendency to firmness. Enquiries have been brisk for the overseas market, which continues reasonably steady.

# TRADE NOTES

### Change of Address

The head office of Reed Corrugated Cases Ltd. was moved on 2 November to Reed House, Kew Bridge, Brentford, Middx (Isleworth 5161).

### Research Chemicals Listed

A new catalogue published by the Aldrich Chemical Co. Inc., Wisconsin, and available from the U.K. sales agents, Ralph N. Emanuel Ltd., 3 Leather Market, London S.E.1, lists about 4,000 research chemicals and biochemicals. Many of the compounds included are said to be supplied only by Aldrich. In addition to an alphabetical list, several compounds are listed in groups such as hydrocarbons, indoles, peptides and phosphorous compounds. An empirical formula index is also included: 300 compounds have been added to the range since publication.

### K.W. Chemicals

Agencies held by K.W. Chemicals Ltd., Caroline House, 55/57 High Holborn, London W.C.1, are listed, with the products concerned, in a new booklet. In the chemicals field, companies represented include Naphtachime, Glamorgan Alkali and Acid, Lancashire Chemical Works, R. H. Cole, Soc. Nationale des Petroles D'Aquitaine (for whom they are U.K. stockists for Lacq sulphur), and Pechiney-Progil: in the plastics fabrication and engineering field firms represented include Soc. Oxybloc and Mapre S.A.

### Wrought Titanium Products

The first of a series of new booklets, entitled 'I.C.I. Titanium—(1) Wrought Products' has now been published by the Metals Division of Imperial Chemical Industries Ltd., P.O. Box 216, Birmingham 6. Of an introductory nature, the booklet describes the company's manufacturing facilities and production range and indicates the principal outlets for titanium and titanium alloys. Other booklets in the series will deal with physical and mechanical properties, corrosion resistance, fabrication, and weight tables.

### Towers Hydrometer Prices

Prices of Towers streamlined hydrometers have been reduced, announce J. W. Towers and Co. Ltd., Victoria House, Widnes, in their *Towers Laboratory News, No. 3*. The latest B.S.S. hydrometers are included in the catalogue at the new prices. This edition also deals with the improved Model 210 automatic direct reading balance that includes a new graticule which gives a clear and brilliant image on the screen. The firm is now offering a comprehensive range of neoprene tubing and bungs.

### Latex Compounding Notes

Latest in the Technical Service Bulletins issued by Monsanto Chemicals Ltd., is on 'Latex Compounding'. It briefly describes the processes involved and gives recommendations on the choice of compounding ingredients.

In dispersion of ingredients, use of a hall mill is indicated and casein or a synthetic stabiliser such as Monsanto's Lytnon 820, which is not subject to bacterial attack. Formulations for dispersions and emulsions are given in the bulletin.

The three dipping processes available are outlined, i.e., straight dipping, coagulant dipping and heat-sensitive dipping. The casting technique for producing low-cost rigid latex articles is described, together with a variant of this technique, known as the Kaysam process. Also included in the bulletin is a note on latex foam.

### New M. & B. Product

May and Baker Ltd., Dagenham, have introduced Slim, a new product in a polythene squeeze bottle, for eradicating photographic silver stains from fabrics. A technical leaflet is available.

### Platinised-Titanium Anodes

High duty platinised-titanium anodes and mountings are the subject of a new leaflet available from Cathodic Corrosion Control Ltd., C.J.B. House, Eastbourne Terrace, London W.2. This equipment is said to have a life of 10 years and to be guaranteed for five years.

### B.C.L. Polythene Film

A new booklet on B.C.L. polythene film is available from British Cellophane Ltd., 9 Henrietta Place, London W.1. The material is suitable for direct contact with chemicals in the form of pouches for pastes and liquids; as a drum liner; or laminated to other materials for added strength and protection.

### *n*-Butanol Price Cut

I.C.I. Heavy Organic Chemicals Division have reduced all prices of its *n*-butanol. For example, the price for a 10-ton tanker load is reduced by £12/ton to £130/ton. This price reduction is made possible by the recent additions at Billingham to I.C.I.'s carbonylation capacity, now well over 60,000 tons/year, which includes increased *n*-butanol production capacity.

### Agency Appointment

Aluminium and copper powders manufactured by Georg Benda-Lutz Werke K.G. will be distributed in the U.K. by 'Exsud' South American Minerals and Products Ltd., 26 Cowcross Street, London E.C.1, who have been appointed sole agents in this market. The products in the German firm's 'Blitz' range comprise: aluminium powder; aluminium paste; bronze powder; bronze paste and electrolytically disintegrated copper powder. Atomised aluminium 'aluminium Atomal' is also included in the range.

## U.K. Production and Consumption of Sulphuric Acid Rises

U.K. CONSUMPTION of sulphuric acid and oleum in the first nine months of this year totalled 572,162 tons, against 515,441 tons in the same period last year. Production by chamber and tower totalled 85,481 tons (101,896 tons) and by contact, 480,970 tons (406,348 tons); total production was 566,451 tons (508,244 tons). The following summaries, issued by the National Sulphuric Acid Association, exclude all Government plants.

**SULPHURIC ACID AND OLEUM**
**1 July to 30 September**
*(Tons of 100% $H_2SO_4$)*

| | Chamber & Tower only | Contact only | Chamber, Tower & Contact |
|---|---|---|---|
| Stock at 1 July ... | 22,890 | 75,432 | 98,322 |
| Production ... | 85,481 | 480,970 | 566,451 |
| Receipts ... | 16,287 | 22,411 | 38,698 |
| Oleum feed ... | — | 132 | 132 |
| Adjustments ... | −46 | −181 | −227 |
| Use ... ... | 53,301 | 312,830 | 366,131 |
| Despatches ... | 49,392 | 187,255 | 236,647 |
| Stock, 30 September | 21,919 | 78,679 | 100,598 |
| Total capacity represented ... ... | 141,990 | 614,770 | 756,760 |
| Percentage production ... ... | 60.2% | 78.2% | 74.9% |

**UK CONSUMPTION**

| Trade Uses | (Tons 100% $H_2SO_4$) 1 July-30 Sept. 1959 | 1 July-30 Sept. 1958 |
|---|---|---|
| Accumulators ... ... | 2,901 | 2,804 |
| Agricultural purposes | 5,908 | 7,112 |
| Bromine ... ... ... | 4,153 | 3,175 |
| Clay (Fuller's earth, etc.) ... | 2,514 | 2,761 |
| Copper pickling ... ... | 524 | 529 |
| Dealers ... ... ... | 3,605 | 2,533 |
| Dichromate & chromic acid... | 4,965 | 3,612 |
| Drugs & fine chemicals ... | 4,768 | 4,173 |
| Dyestuffs & intermediates ... | 24,250 | 17,699 |
| Explosives ... ... ... | 2,720 | 2,504 |
| Export ... ... ... | 747 | 649 |
| Glue, gelatine & size ... | 100 | 98 |
| Hydrochloric acid ... ... | 11,134 | 12,171 |
| Hydrofluoric acid ... ... | 3,242 | 2,243 |
| Iron pickling (inc. tin plate) ... | 29,095 | 25,567 |
| Leather ... ... ... | 1,053 | 1,017 |
| Lithopone ... ... ... | 3,199 | 2,405 |
| Metal extraction ... ... | 691 | 633 |
| Oil refining & petroleum products ... ... ... | 15,247 | 13,485 |
| Oils (vegetable) ... ... | 1,766 | 2,431 |
| Paper, etc. ... ... ... | 1,560 | 1,752 |
| Phosphates (industrial) ... | 659 | 37 |
| Plastics, not otherwise classified ... ... ... ... | 12,487 | 9,075 |
| Rayon & transparent paper ... | 65,091 | 54,239 |
| Sewage ... ... ... | 3,355 | 2,463 |
| Soap, glycerine & detergents | 27,466 | 26,395 |
| Sugar refining ... ... | 154 | 158 |
| Sulphate of ammonia ... | 64,142 | 66,123 |
| Sulphates of copper, nickel, etc. ... ... ... ... | 4,043 | 2,491 |
| Sulphate of magnesium ... | 47 | 23 |
| Superphosphates ... ... | 109,568 | 114,081 |
| Tar & benzole ... ... | 6,341 | 6,853 |
| Textile uses ... ... | 2,693 | 2,572 |
| Titanium dioxide ... ... | 103,362 | 74,828 |
| Unclassified ... ... ... | 48,612 | 46,750 |
| Total ... ... | 572,162 | 515,441 |

*Note.*—These Summaries exclude all Government plants.

**RAW MATERIALS**
*(Tons)*

| | Pyrites | Spent Oxide | Sulphur: Imported | Sulphur: Recovered $H_2S$ and Filter Cake | Zinc Concentrates | Anhydrite |
|---|---|---|---|---|---|---|
| Stock, 1 July ... ... ... | 142,658 | 95,743 | 53,110 | 5,885 | 63,890 | 6,176 |
| Receipts ... ... ... | 79,497 | 46,976 | 95,551 | 17,461 | 34,354 | 180,933 |
| Adjustments ... ... ... | +1,189 | +781 | +72 | +79 | +101 | — |
| Use ... ... ... ... | 74,847 | 50,600 | 74,780 | 15,009 | 46,967 | 175,315 |
| Despatches ... ... ... | 1,252 | 1,104 | 2,702 | 727 | — | — |
| Stock, 30 Sept. ... ... | 147,245 | 91,796 | 71,251 | 7,689 | 51,378 | 11,794 |

# NEW PATENTS

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*Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.*

## AMENDED SPECIFICATIONS

### On Sale 16 December

Precipitation of hydrous vanadium peroxide. Vanadium Corp. of America. **680 413**

Cleaning wool using detergent compositions. Monsanto Chemicals Ltd. **738 278**

## ACCEPTANCES

### Open to public inspection 23 December

Dispersion separation. Kilpatrick, M. **825 923**

Preparation of pellets from powdered materials. Cawood Wharton & Co. Ltd. **825 703**

Manufacture of barbituric and thiobarbituric acids. Abbott Laboratories. [Cognate application.] **825 832**

Coating compositions. Imperial Chemical Industries Ltd. **826 009**

Production of chlorocyanuric acids. Monsanto Chemical Co. **825 929**

Synthetic peroxidasic compounds and their preparation. Solomides, J. **825 930**

Method of carrying out endothermic chemical gas reactions. Farbwerke Hoechst AG. **825 841**

Treatment of ricinoleic acid and its esters. Organico. **825 932**

Separation of the isotopes of hydrogen. U.K. Atomic Energy Authority. **825 934**

Soybean phosphatide emulsifiers. Armour & Co. [Addition to 770 427.] **825 936**

Manufacture of hydrogen peroxide solutions having a high electrical resistance. Alpine Chemische AG. **826 015**

Forming superficial diffusion alloys containing chromium. Office National d'Etudes et de Recherches Aeronautiques O.N.E.R.. [Addition to 693 292.] **825 847**

Process and apparatus for treating pulverulent materials. Ruhrchemie AG. **826 020**

Optical bleaching agents. Compagnie Francaise des Matieres Colorantes. **825 751**

Production of crystalline polystyrene. Montecatini Societa Generale per l'Industrie Mineraria E. Chimica. **826 021**

Manufacture of sodium sulphide from sodium sulphate. Farbenfabrik Wolfen Veb. **826 023**

Improving the stability of polymers of trifluorochloroethylene. Farbwerke Hoechst AG. **825 853**

Compositions comprising water-repellent alkylated monoazo dyes. Midlands Chemical Corp. **825 857**

Hydroquinone compounds and process for their manufacture. Ciba Ltd. **825 760**

Compound of the cyclopentanopoly-hydrophenanthrene series, the preparation thereof, and therapeutic compositions containing said compound. [Addition to 719 402.] **826 028**

Catalytic production of hydrocyanic acid and hydrogen from mixtures of hydrocarbon and ammonia. **825 762**

Electrolytic production of magnesium. Egami, I. Co. Ltd. **825 785**

Substituted phenoxy-propionic acid esters and compositions containing them. Boots Pure Drug Co. **825 875**

Polymeric organic compounds containing phosphorus. U.K. Atomic Energy Authority. [Divided out of 19 613/54.] **825 767**

Polymeric reaction products of aluminium alkoxides. Hardman & Holden Ltd. **825 878**

Electrolytic purification of titanium. Minister of Supply. **825 951**

Producing sulphonated alkylated aromatic hydrocarbons. Continental Oil Co. **825 952**

Production of metal strip from metal powder. Mond Nickel Co. Ltd. **825 953**

Production of hot gases by the burning of liquid-fuel. Fraser, R. P. **825 880**

Substituted carbanilides. Merck & Co. Inc. **825 921**

Electrochemical method for coating steel surfaces and the product thereof. United States Steel Corp. [Addition to 745 676.] **825 862**

Thiophosphoric acid esters and a process for their production. Farbenfabriken Bayer AG. **826 037**

Protective coating of light metals and alloys. Coal Industry (Patents) Ltd. **826 038**

Coloration process for cellulosic textiles. Imperial Chemical Industries Ltd. **825 771**

Foamed resin materials. Baxenden Chemical Co. Ltd. **825 869**

Producing homopolymers of ethylene. Farbenfabriken Bayer AG. [Addition to 811 633.] **825 958**

Producing modified polymers. Phillips Petroleum Co. **825 882**

Ethylene polymer-rubbery *iso*olefin polymer compositions. Phillips Petroleum Co. **825 884**

Copolymers of propylene. Esso Research & Engineering Co. **825 885**

Carrying out polymerisation processes. Badische Anilin- & Soda-Fabrik AG. **826 053**

Waterproofing leather. Boehme Fettchemie GmbH. **826 065**

Albumin diagnostic composition. Miles Laboratories Inc. **826 066**

Production of alumina. Imperial Chemical Industries Ltd. **825 972**

Separation of hydrogen from mixtures of gases containing hydrogen. Johnson, Matthey & Co. Ltd. **825 973**

Tabletting process. Imperial Chemical Industries Ltd. **825 892**

Aromatic carboxylic acids. Imperial Chemical Industries Ltd. **825 975**

Production of phosphates. Monsanto Chemical Co. **825 976**

Plasticisers. Dehydag Deutsche Hydrier-Werke GmbH. **825 893**

Preparing polymeric products from abietyl alcohols. Union Chimique Belge SA. **825 979**

Preparation of the 3-methylamino-isocamphane. Instituto de Angeli SpA. **825 895**

Elastomeric cellular material. Goodyear Tire & Rubber Co. **825 896**

Apparatus for producing plattened tubular film of thermoplastic organic polymeric material. Lonza Electric & Chemical Works Ltd. **825 897**

Photopolymerisable compositions and elements and process of making reliefs therefrom. Du Pont de Nemours & Co., E. I. **825 795**

Method of alkylating silicon tetrachloride or arkyl- or aryl-chlorosilanes. Kali-Chemie AG. **825 987**

Separation of gaseous or vaporous substances, more especially isotopes. Becker, E. W. A. [Addition to 794 834.] **825 798**

Filtering installations. Sulzers Fréres Soc. Anon. **826 081**

Bleaching alkylated aryl sulphonic acids. Monsanto Chemical Co. **825 800**

Amido-phosphate ester and acrylonitrile polymers flameproofed therewith. Monsanto Chemical Co. **825 803**

Carbon electrodes. Diamond Alkali Co. **826 084**

Metal soap driers suitable for use in coating compositions: and compositions containing such driers. Shell Research Ltd. **825 805**

Separation of normal hydrocarbons from mixtures by selective adsorption. Bataafsche Petroleum Maatschappij NV., DE. **826 089**

Preparation of sulphur-containing piperazine compounds. Pfizer & Co. Inc., C. **825 995**

Production of neutral synthetic anhydrite. Reimers, GmbH, H. **825 735**

Preparation of salts of epoxy-fatty acids. Union Carbide Corp. **825 691**

Production of benzene dicarboxylic acids and their alkanol esters. Badische Anilin- & Soda-Fabrik AG. **825 998**

Production of finely divided metals. General Aniline & Film Corp. **825 740**

Vulcanisation of butyl rubber. United States Rubber Co. **826 092**

Method and apparatus for controlling the flow of powered granulated and like discrete materials through a conduit. African Explosives & Chemical Industries Ltd. **825 810**

Production of melamine. Consolidated Mining & Smelting Co. of Canada Ltd. **825 729 & 825 730**

Bleaching of cellulosic fabrics. Food Machinery & Chemical Corp. **826 094**

Worm devices for degassing liquids and the like. Farbenfabriken Bayer AG. **826 096**

*l*-Glutamic acid by fermentation. Shinshin Shokuryo Kogyo Kabushiki Kaisha. **826 097**

Manufacture of sulphenamides. United States Rubber Co. **825 904**

Apparatus for propagating and promoting growth of plants. Murray, L. E. R. **826 101**

Skin protective compositions containing siloxanes. Midland Silicones Ltd. **825 906**

Lubricating oil compositions. Bataafsche Petroleum Maatschappij NV., De. **826 102**

Dodecahydro-phenanthrene derivative and a process for the manufacture thereof. Hoffmann-La Roche & Co. AG., F. **825 907**

Preparation of chloroprene. Du Pont de Nemours & Co., E. I. **825 816**

Chromatographic analysis of a multi-component vapour. Union Carbide Corp. **826 110**

Dimethyldithiocarbamic acid complex and the preparation thereof. Uclaf. **825 901**

Rubber compounding. Columbian Carbo Co. **825 819**

Condensation and polymerisation agents. Reidel-De Haen AG. **825 902**

Benzyl isothiocyanates. Monsanto Canada Ltd. **825 693**

Plant for the vaporisation of liquids. Fischer, E., and Jenssen, H. A. W. G. [trading as Schmidt Söhne CA.] **825 911**

Therapeutic compositions for treating poultry. Merck & Co. Inc. [Divided out of 825 921.] **825 922**

Coloration process for artificial fibres. Imperial Chemical Industries Ltd. [Divided out of 822 500.] **825 912**

## New Plywood Resin From Monsanto Chemicals

A NEW, reactive phenol-formaldehyde aqueous resin syrup—Lauxite PF.517—for the manufacture of weatherproof plywood (W.B.P. grade to B.S.1203:1954) has been developed by Monsanto Chemicals Ltd.

When used with the special Lauxite 517 filler, press temperatures of 230°-240°F can be employed to give flat, blister-free boards requiring no further conditioning. With veneers of low moisture content, where higher press temperatures (275°-285°F) are possible, a simple filler such as coconut shell flour is said to give excellent bonds.

Under either set of conditions the bond is strong and unaffected by boiling water, fungi and wood-destroying insects. Extensive weathering trials have shown that the adhesive is more durable than the wood itself.

## British-made Infra-red Moisture Tester Sought

A British-made infra-red moisture tester is sought by a company in Ceylon. Although these instruments are made elsewhere in Europe, the company in Ceylon, being British, is precluded from importing them. If any readers of CHEMICAL AGE know of such an instrument, made in this country, it would be appreciated if they would send a note of the manufacturer's name and address to the Editor, at 154 Fleet Street, London E.C.4.

## Factory Extension Approved

Detailed plans for the erection of a chemical laboratory at the Lower Road, Halewood factory of Ward, Blenkinsop and Co. Ltd., to be used in the manufacture of fine chemicals, have been approved by Whiston planning and development committee.

7 November 1959

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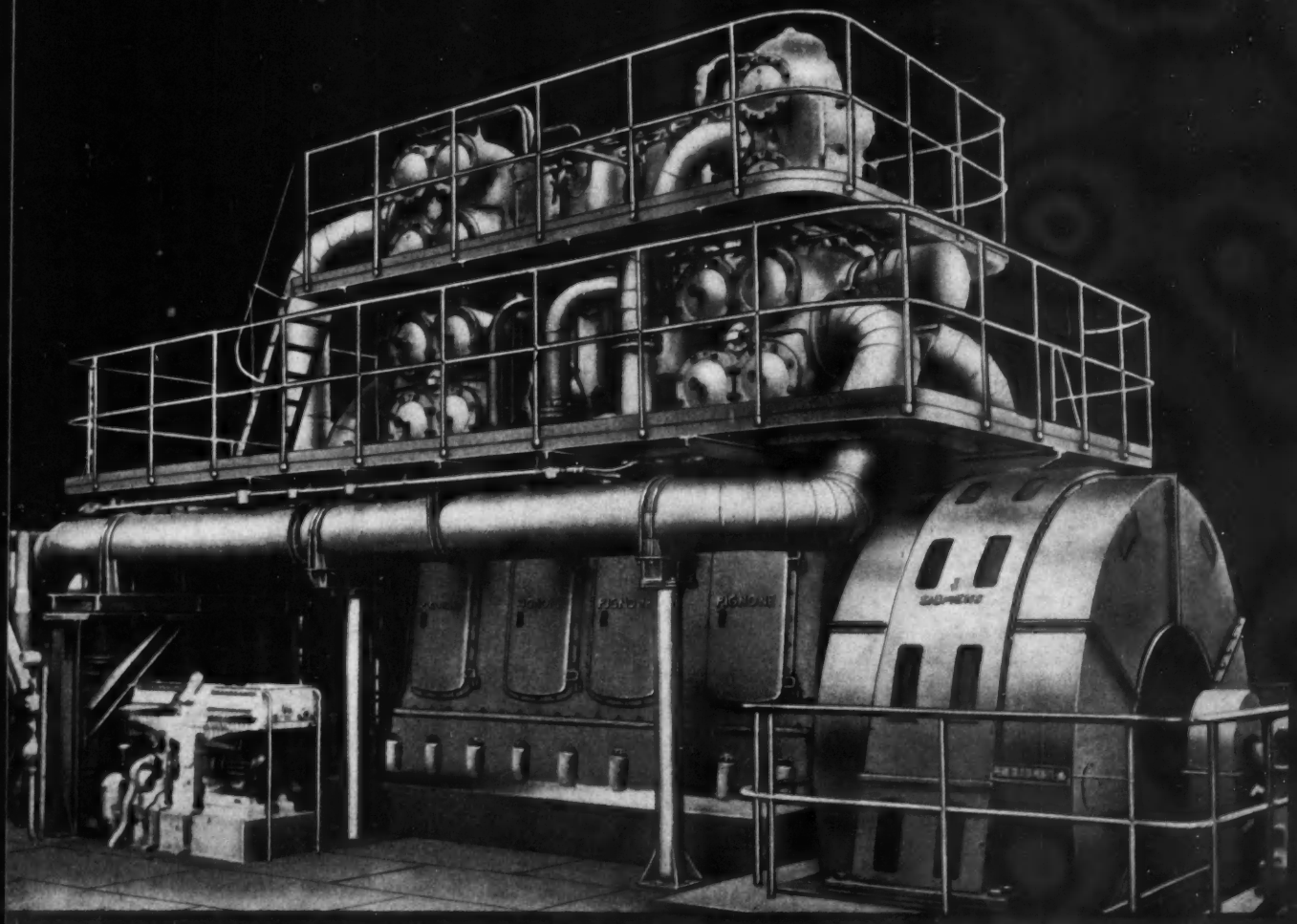

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